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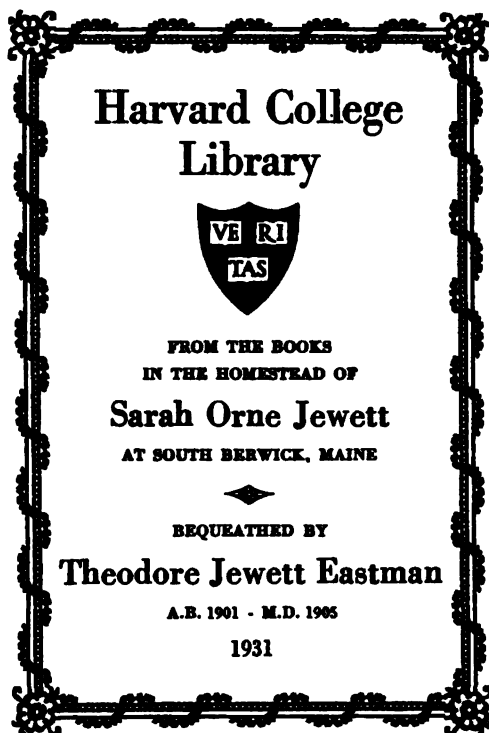


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NATURAL HISTORY



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Theodore J. Eastman

Christmas, 1884.









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ILLUSTRATED

NATURAL HISTORY

FOR YOUNG PEOPLE

BY THE REV.
J. G. WOOD, M.A., F.L.S.
AUTHOR OF "THE NEW ILLUSTRATED NATURAL HISTORY," ETC., ETC.



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PREFATORY.

ALTHOUGH the number of works on Natural History might deter any new writer from venturing on so extensively handled a subject, there is at present no work of a really popular character in which accuracy of information and systematic arrangement are united with brevity and simplicity of treatment.

All the best-known popular works on Natural History are liable to many objections, among which may be named a want of correct classification, the absence of explanations of the meanings and derivations of scientific words, the strange inaccuracy of many of the accompanying illustrations, and of the accounts of many animals. Nor do the conventional anecdotes chronicled in their pages evince that personal experience of the animal race which alone can repress romance and prevent inaccuracy. These deficiencies, it is hoped, are at all events partly supplied in the present work.

The present volume, although exceeding the limits originally contemplated, is but a brief digest of a large mass of materials, derived either from personal experience, from the most recent zoological writers, or from the kindness of many friends, who are familiar with almost every portion of the world, and to whom my best thanks are due. My original intention was to carry the work as far as the

Zoophytes, but it grew so rapidly, especially in the first two classes, the Mammals and Birds, that it was found necessary to conclude at the Insects, and even then to give but an exceedingly short and meagre account of them. This was much regretted by me, as my experience had lain so much in the practical entomological part of Natural History, that during the earlier stages of the work I looked forward with some pleasure to giving a very much fuller account of Insects than will be found in the last few pages of this volume.

It has been an object with me in the accounts of each animal to give as far as possible *new* anecdotes. In many cases the anecdotes related have never been published before, and in many more they have been extracted from works which, either from their scarcity, their cost, or their nature, would be very unlikely to be placed in the hands of general readers.

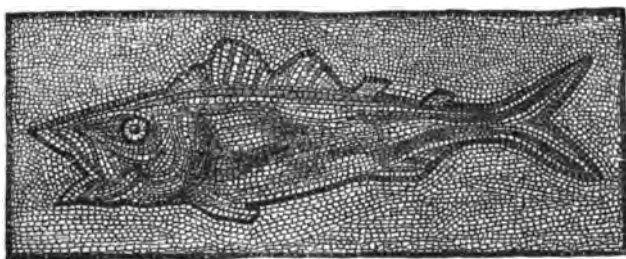
I dismiss these pages with almost a feeling of regret, that a task which has to me been a labor of love has come to an end. Indeed, the only drawback experienced during its progress was its necessary brevity, which constrained me to omit many creatures not only beautiful and wonderful in form, but interesting in habits. I was also compelled to describe many others so briefly as to render the account little more than a formal announcement of their name, country, and food. If, however, the perusal of the following pages should induce any one to look upon the great plan of Creation more as a whole than merely as an aggregation of separate parts, or to notice how wonderfully each creature is adapted for its peculiar station by Him who has appointed to each its proper position, and assigned to each its own duties, which could not be performed so well by any other creature, or even by the same animal in another place, my end will be attained.

Perhaps, also, this volume may cause some who have hitherto been troubled with a causeless abhorrence of certain creatures, against which they have nourished early prejudices, to examine them with a more indulgent—I should perhaps say a more reverent eye. I say reverent, because it has long given me deep pain when I have heard others stigmatizing as ugly, horrid, or frightful, those beings whom their Maker saw at the beginning of the world and declared very good. A naturalist will see as much beauty in a snake, spider, or toad, as in any of those animals which we are accustomed to consider models of beauty; and so will those who have before feared or despised them, if they can only persuade themselves to

examine them with an unprejudiced eye. In those three creatures mentioned there is great beauty even on a superficial examination. The movements of the snake are most graceful, and the changing colors of its varied scales leave the imitations of art far behind. The spiders, too, are beautiful, even in color. Some are bright crimson, some pale pink, some entirely yellow, some banded with broad streaks of alternately velvety black and silvery white, while the eye of the toad is a living gem of beauty. But when we come to look closer, to watch their habits, to note their instincts, or by the use of the microscope to lay open to our view some of the details of their organization, then indeed are we lost in wonder and amaze at the vastness of creation, which, even in one little, apparently insignificant animal, presents to our eyes innumerable marvels—marvels which increase in number and beauty as our power for perceiving them increases.

The present edition may rather be termed a condensation than an abridgment of the larger work. I have endeavored to make no omissions that would destroy one link of the marvellous living chain that binds all animate existences of earth into one harmonious whole; and in compressing the subject into a smaller compass I have concentrated the language without excluding any necessary information. In conclusion, I desire to acknowledge my indebtedness to the author of the "Young Folks' Cyclopædia."

J. G. W.





NATURAL HISTORY.

QUADRUMANA; OR, THE MONKEY TRIBE.

THE section **QUADRUMANA** includes the apes, baboons, and monkeys. The name **Quadrumania** is given to these animals because, in addition to two hands like those of man, their feet are also formed like hands, and are capable of grasping the branches among which most monkeys pass their lives.

Apes are placed at the head of the **Quadrumania** because their instinct is mostly superior to that of the baboons and monkeys, of whom the former are usually sullen and ferocious, when arrived at their full growth, and the latter volatile and mischievous.

The first in order, as well as the largest of the Apes, is the enormous ape from Western Africa, the **GORILLA**. The first modern writer who brought the gorilla before the notice of the public seems to be Mr. Bowdich, the well-known African traveller; for it is evidently of the gorilla that he speaks under the name of **Ingheena**. The natives of the Gaboon and its vicinity use the name **Gina**, when mentioning the gorilla. The many tales, too, that are told of the habits, the gigantic strength, and the general appearance of the **Ingheena**, are precisely those which are attributed to the gorilla.

The outline of the gorilla's face is most brutal in character, and entirely destroys the slight resemblance to the human countenance which the full form exhibits. As in the Chimpanzee, an ape which is placed in the same genus with the gorilla, the color of the hair is nearly black; but in some lights, and during the life of the animal, it assumes a lighter tinge of grayish brown, on account of the admixture of variously colored hairs. On the top of the head and the side of the cheeks it assumes a grizzly hue. The length of the hair is not very great, considering the size of the animal, and is not more than two or three inches.

As to the habits of the gorilla many conflicting tales have been told, and many have been the consequent controversies. In order to settle the disputed questions, Mr. Winwoode Reade undertook a journey to Western Africa, where he remained for a considerable time. After careful investigation, he sums up the history of the animal as follows:

"The ordinary cry of a gorilla is of a plaintive character, but in rage it is a sharp, hoarse bark, not unlike the roar of the tiger. Owing to the negro propensity for exaggeration, I at first heard some very remarkable stories about the ferocity of the gorilla; but when I questioned the real hunters, I found them, as far as I could judge, like most courageous men, modest, and rather taciturn than garrulous. Their account of the ape's ferocity scarcely bears out those afforded by Drs. Savage and Ford. They deny that the gorilla ever attacks man without provocation. 'Leave Njina alone,' they say, 'and Njina leave you alone.' But when the gorilla, surprised while feeding or asleep, is suddenly brought to bay, he goes round in a kind of half-circle, keeping his eyes fixed on the man, and uttering a complaining, uneasy cry. If the hunter shoots at him, and the gun misses fire, or if the ape is wounded, he will sometimes run away; sometimes, however, he will charge, with his fierce look, his lowered lip, his hair falling on his brow. He does not, however, appear to be very agile, for the hunters frequently escape from him.

"His charge is made on all-fours: he seizes the offensive object, and, dragging it into his mouth, bites it. The story of his crushing a musket-barrel between his teeth is general, and a French officer told me that a gun was exhibited at the French settlements in the Gaboon twisted '*comme une papillote*.' This, however, is not very wonderful, for the cheap Birmingham guns, with barrels made of 'sham-dam-skelp' iron, which are sold to the natives, might easily be bent and twisted by a strong-jawed animal. I heard a great deal about men being killed by gorillas, but wherever I went I found that the story retreated to tradition. That a man might be killed by a gorilla I do not affect to doubt for a moment, but that a man has not been killed by one within the memory of the living, I can most firmly assert.

"I once saw a man who had been wounded by a gorilla. It was Etia, the Mchaga hunter, who piloted me in the forests of Ngumbi. His left hand was completely crippled, and the marks of teeth were visible on the wrist. I asked him to show me exactly how the gorilla attacked him. I was to be the hunter, he the gorilla. I pretended to shoot at him. He rushed toward me on all-fours, and seizing my wrist with one of his hands, dragged it to his mouth, bit it, and then made off. So, he said, the Njina had done to him. It is by these simple tests that one can best arrive at truth among the negroes. That which I can attest from my own personal experience in my unsuccessful attempts to shoot a gorilla, is as follows: I have seen the nests of the gorillas, as I have described them; I cannot say posi-



THE GORILLA.

tively whether they are used as beds, or only as lying-in couches. I have repeatedly seen the tracks of the gorillas, and could tell by the tracks that the gorilla goes habitually on all-fours."

The CHIMPANZEE is a native of Western Africa, and is tolerably common on the banks of the Gambia and in Congo.

Large bands of these formidable apes congregate together and unite in repelling an invader, which they do with such fury and courage that even the dreaded elephant and lion are driven from their haunts by their united efforts. They live principally on the ground, and, as their name imports, spend much of their time in caves and under rocks. Their height is from four to five feet, but they are said not to reach this growth until nine or ten years of age.

Several young chimpanzees have been imported into this country, and have shown themselves very docile and gentle.

The ORANG-OUTANG inhabits Borneo and Sumatra. In Borneo there are certainly two species of orang, called by the natives the Mias-kassar and the Mias-pappan. Some naturalists suppose that the Sumatran orang is also a distinct species. This is the largest of all the apes, as it is said that orangs have been obtained from Borneo considerably above five feet in height. The strength of this animal is tremendous; a female snapped a strong spear asunder after having received many severe wounds. Its arms are of extraordinary length, the hands reaching the ground when it stands erect. This length of arm is admirably adapted for climbing trees, on which it principally resides. Mr. Brooke, the Rajah of Sarawak, gives the following account of the orangs of Borneo. There appears also to be a third species, the Mias-rombi:

"On the habits of the orangs, as far as I have been able to observe them, I may remark that they are as dull and as slothful as can well be conceived, and on no occasion, when pursuing them, did they move so fast as to preclude my keeping pace with them easily through a moderately clear forest; and even when obstructions below (such as wading up to the neck) allowed them to get away some distance, they were sure to stop and allow us to come up. I never observed the slightest attempt at defence; and the wood, which sometimes rattled about our ears, was broken by their weight, and not thrown, as some persons represent. If pushed to extremity, however, the pappan could not be otherwise than formidable; and one unfortunate man, who with a party was trying to catch one alive, lost two of his fingers, besides being severely bitten on the face, while the animal finally beat off his pursuers and escaped. When they wish to catch an adult, they cut down a circle of trees round the one on which he is seated, and then fell that also, and close before he can recover himself, and endeavor to bind him.

"The rude hut which they are stated to build in the trees would be more properly called a seat, or nest, for it has no roof or cover of any sort. The facility

with which they form this seat is curious; and I had an opportunity of seeing a wounded female weave the branches together, and seat herself in a minute. She afterward received our fire without moving, and expired in her lofty abode, whence it cost us much trouble to dislodge her.

"The pappan is justly named *Satyrus*, from its ugly face and disgusting callosities. The adult male I killed was seated lazily on a tree, and when approached only took the trouble to interpose the trunk between us, peeping at me and dodging as I dodged. I hit him on the wrist, and he was afterward despatched. I send you his proportions, enormous relative to his height; and until I came to actual measurement my impression was that he was nearly six feet in stature.

"The great difference between the *kassar* and the *pappan* in size would prove at once the distinctness of the two species; the *kassar* being a small, slight animal, by no means formidable in his appearance, with hands and feet proportioned to the body, and they do not approach the gigantic extremities of the *pappan* either in size or power; and, in short, a moderately strong man would readily overpower one, when he would not stand a shadow of a chance with the *pappan*."

I saw a young orang-outang not long since. It was rather spidery in its development, having a very small and very rotund body, to which were affixed very long and slender limbs. Its face was like that of a very misanthropical old miser, thoroughly wearied of life, and contemplating surrounding objects with a calm but derisive pity. It possessed in a high degree the expressive mobile character of the lips, which appeared to denote its feelings much in the same manner as do the ears of a horse. When it was alarmed or astonished at any object it was accustomed to shoot out both its lips, and to form its mouth into a trumpet kind of shape. A snail was very effectual in producing this contortion of countenance. The creature was very tame, and delighted in walking about the garden leaning on the arm of its keeper, and if any lady would venture to be its guide, it appeared as happy as any such misanthropical being could be.

When young, the orang-outang is very docile, and has been taught to make its own bed, and to handle a cup and saucer or a spoon with tolerable propriety. For the former occupation it proved itself particularly apt, as it not only laid its own bed-clothes smooth and comfortable, but exhibited much ingenuity in stealing blankets from other beds, which it added to its own. The young orang in the collection of the Zoological Society evinced extreme horror at the sight of a small tortoise, and, when the reptile was introduced into its den, stood aghast in a most ludicrously terrified attitude, with its eyes intently fixed on the frightful object.

The AGILE GIBBON is a native of Sumatra. It derives its name of Agile from the wonderful activity it displays in launching itself through the air from branch to branch. One of these creatures that was exhibited in London some time since sprang with the greatest ease through distances of twelve and eighteen feet, and when apples or nuts were thrown to her while in the air, she would catch them

without discontinuing her course. She kept up a succession of springs, hardly touching the branches in her progress, continually uttering a musical but almost deafening cry. She was very tame and gentle, and would permit herself to be touched or caressed. The height of the gibbon is about three feet, and the reach of the extended arms about six feet. The young gibbon is usually of a paler color than its parent. There are several species of gibbon, among which some naturalists include the Siamang, a monkey chiefly celebrated for the pains it takes to wash the faces of its young, a duty which it conscientiously performs in spite of the struggles and screams of its aggrieved offspring.

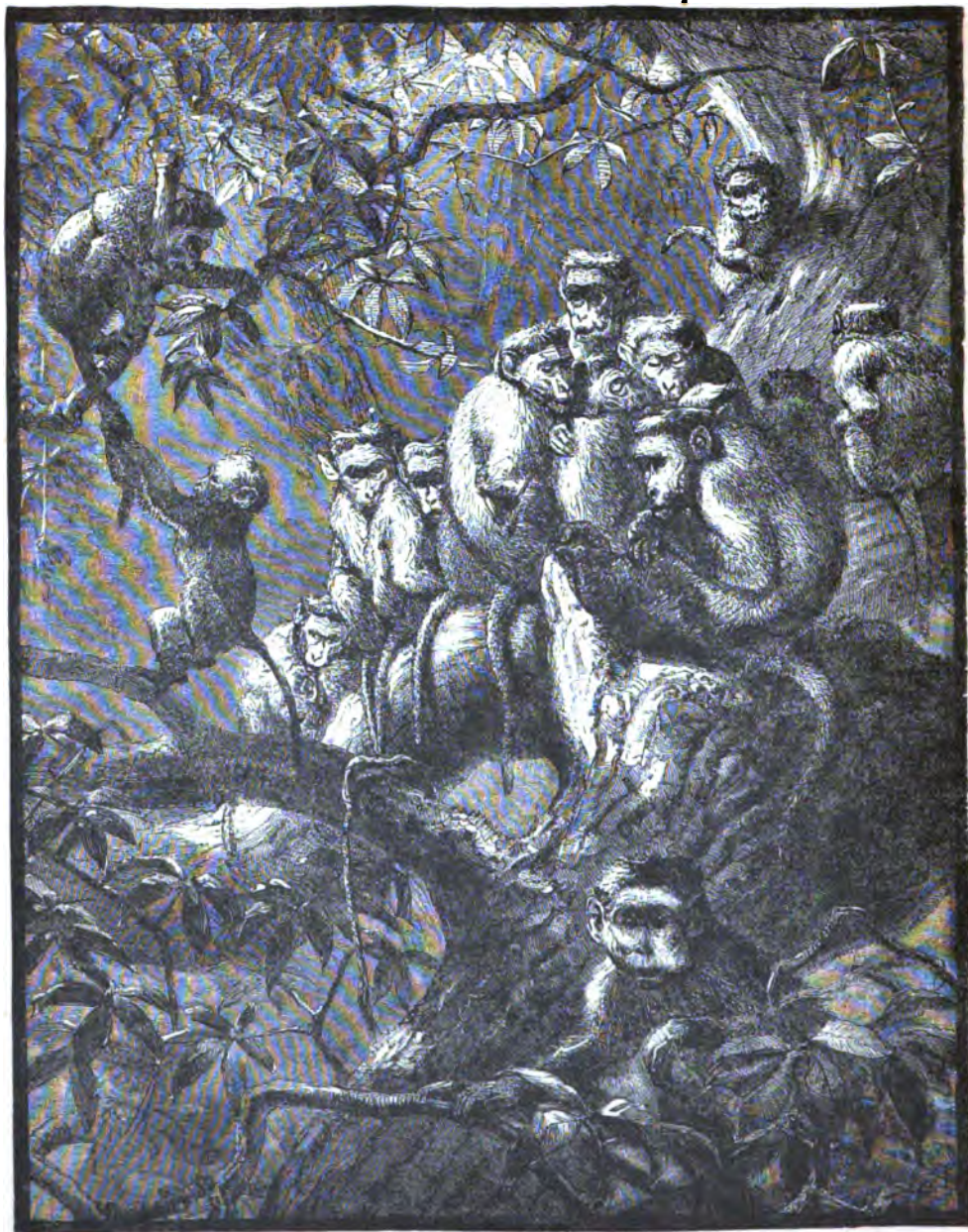
The KAHAU is a native of Borneo. It derives its name from the cry it utters, which is a repetition of the word "Kahau." It is remarkable for the extraordinary size and shape of its nose, and the natives relate that while leaping it holds that organ with its paws, apparently to guard it against the branches. As may be seen from the engraving, it is not an animal of very captivating appearance; but when it has been macerated in spirits of wine for a few months, its ugliness is quite preternatural. The length of the animal from the head to the tip of the tail is about four feet four inches; and its general color is a sandy red, relieved by yellow cheeks and a yellow stripe over the shoulders.



KAHAU.—*Presbytis Larvatus*.

We now arrive at the BABOONS. This tribe is principally distinguished from the apes by their short and insignificant-looking tails. The MANDRILL, which is the most conspicuous of the baboon tribe, is a native of Guinea and Western Africa, and is chiefly remarkable for the vivid colors with which it is adorned. Its cheeks are of a brilliant blue, its muzzle of a bright scarlet, and a stripe of crimson runs along the centre of its nose. These colors are agreeably contrasted by the purple hues of the hinder quarters. It lives principally in forests filled with brushwood, from which it makes incursions into the nearest villages, plundering them with impunity. On this account it is much dreaded by the natives, who feel themselves incapable of resisting its attacks. It is excessively ferocious, and easily excited to anger, and when enraged, so boundless is its rage, that Cuvier relates that he has seen several of these animals actually expire from the violence of their fury. The greenish-brown color of the hair of this and other monkeys is caused by alternate bands of yellow and black which exist on each hair. The brilliant colors referred to above belong to the skin, and fade away entirely after death, becoming paler when the animal is not in perfect health.

The AMERICAN MONKEYS, or Cebidæ, are found exclusively in South America,



A HAPPY FAMILY.

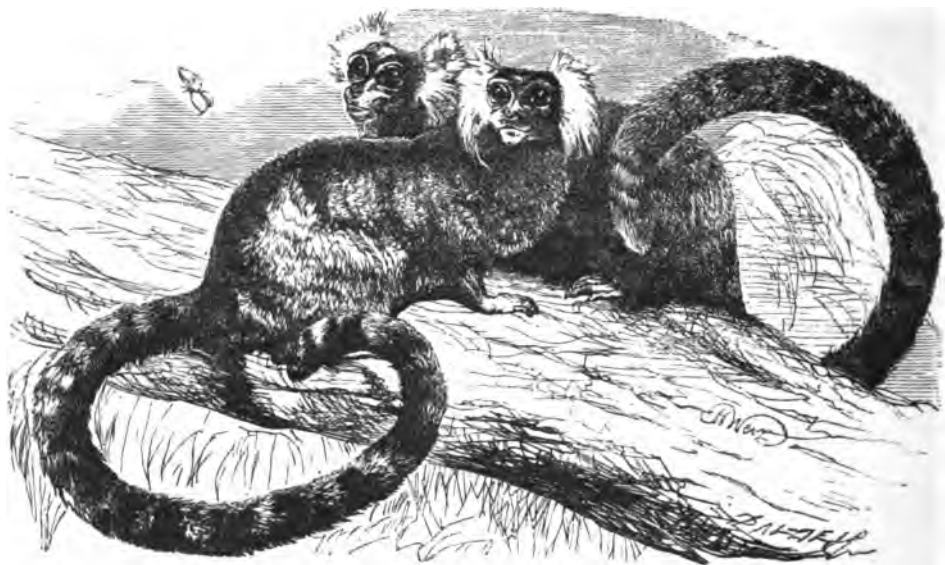
and are never seen north of Panama. Their tails are invariably long, and, in some genera, prehensile.

The Coaita is one of the SPIDER MONKEYS, so called from their long, slender limbs, and their method of progressing among the branches. The tail seems to answer the purpose of a fifth hand, as it is capable of being used for every purpose to which the hand could be applied; indeed, the Spider Monkeys are said to use this member for hooking out objects where a hand could not be inserted. The tail is also of considerable use in climbing among the branches of trees; they coil it round the boughs to lower or raise themselves, and often will suspend themselves entirely by it, and then by a more powerful impetus swing off to some distant branch. The habits of all the Spider Monkeys are very similar. They are extremely sensitive to cold, and when chilly are in the habit of wrapping their tail about them, so that this useful organ answers the purpose of a boa as well as a hand. They will also, when shot, fasten their tail so firmly on the branches that they remain suspended after death. The great length of their tail enables them to walk in the erect attitude better than most monkeys. In walking, they cast their tails upward as high as the shoulders, and then bend it over so as to form a counter-balance against the weight of the body, which is thrown very much forward in that and most other monkeys. The genus is called *Ateles*, or imperfect, because in most of the species the thumb is wanting. The Coaita inhabits Surinam and Guinea.

The HOWLING MONKEYS are larger and not so agile as the Spider Monkeys, and are chiefly remarkable for the peculiarity from which they derive their name. These animals possess an enlargement in the throat, composed of several valvular pouches, which apparatus renders their cry exceedingly loud and mournful. An arrangement somewhat similar may be seen in the throat of several loud-voiced birds. They howl in concert, principally at the rising and setting of the sun; one monkey begins the cry, which is gradually taken up by the rest, precisely as may be observed in a colony of rooks. They are in great request among the natives as articles of food, their slow habits rendering them an easy prey.

The URSINE HOWLER, or Araguato, is common in Brazil, where forty or fifty have been observed on one tree. They generally travel in files, an old monkey taking the lead, and the others following in due order. They feed principally on leaves and fruit; the tail is prehensile like that of the Spider Monkeys.

The MARMOSET is a most interesting little creature. It is exceedingly sensitive to cold, and when in America is usually occupied in nestling among the materials for its bed, which it heaps up in one corner, and out of which it seldom emerges entirely. It will eat almost any article of food, but is especially fond of insects, which it dispatches in a very adroit manner. It will also eat fruits, especially those of its native country. Its fondness for insects is carried so far, that it has been known to pinch out the figures of beetles in entomological work and swallow them.

MARMOSET.—*Jacchus Vulgaris*.

A beautiful little marmoset in the Zoological Gardens ate a great number of flies which I caught and presented to it. Its little eyes sparkled with eagerness each time that it saw my hand moving toward a fly settled out of its reach, and it even ventured from its warm woolly nest, and climbed up the wires of its cage as it saw the fly approaching. It was also rather expert at catching for itself the flies that settled on the bars of the cage. A blue-bottle fly was evidently considered a great prize. This pretty little monkey is also called the Ouistiti, from its peculiar whistling cry when alarmed or provoked.

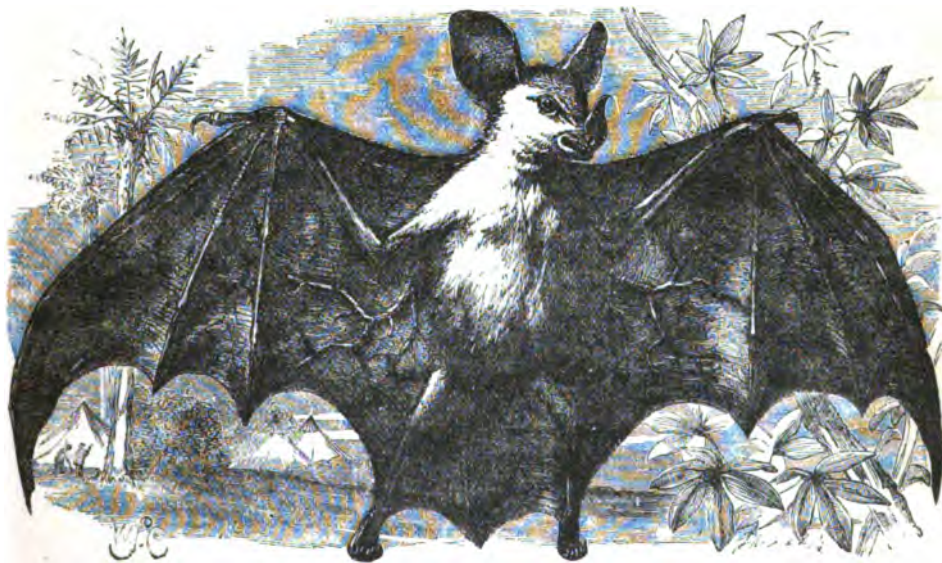
The LEMURS derive their name from their nocturnal habits and their noiseless movements. The Ruffled Lemur is a native of Madagascar. It lives in the depths of the forests, and only moves by night, the entire day being spent in sleep. Its food consists of fruits, insects, and small birds, which latter it takes while they are sleeping. This is the largest of the lemurs, being rather larger than a cat.

The SLENDER LORIS is a native of India, Ceylon, etc. It, like the lemur, seldom moves by day, but prowls about at night in search of food. No sooner does it espy a sleeping bird than it slowly advances until within reach, then putting forward its paw with a motion slow and imperceptible as the movement of the shadow on the dial, it gradually places its fingers over the devoted bird; then, with a movement swifter than the eye can follow, it seizes its startled prey.

WING-HANDED ANIMALS.

We now arrive at the BATS, or Cheiroptera (Wing-handed Animals). This name is derived from the singular manner in which their forepaws, or hands, are developed into wings. If the fingers of a man were to be drawn out like wire to about four feet in length, a thin membrane to extend from finger to finger, and another membrane to fall from the little finger to the ankles, he would make a very tolerable imitation of a bat.

The usual food of bats is insects, which they mostly capture on the wing, but some, as the Vampires, suck blood from other animals, and a few, as the Kalong, or Flying Fox, live upon fruits, and so devastate the mango crops, that the natives are forced to cover them with bamboo baskets, to preserve them from the ravages of these animals, who would soon strip the fruit trees without these precautions. Even the cocoa-nut is not secure from their depredations. The membrane of the

VAMPIRE BAT.—*Vampyrus spectrum*.

bat's wing is plentifully supplied with nerves, and is extremely sensitive, almost appearing to supply a sense independent of sight. Many bats possess a similar membrane on the nose, which is possibly used for the same purpose. The object of the elongation of the finger joints is to give the animal the power of extending the wing membrane or folding it at pleasure. When the bat wishes to walk, it

half folds the membrane, and assumes an attitude admirably represented in pictures of the Long-eared Bat. The thumb-joint has no part of the wing attached to it, but is left free, and is armed with a hook at the extremity, by means of which it is enabled to drag itself along in that singular vacillating hobble which constitutes a bat's walk.

There are five tribes, or sub-families, of bats, according to Gray, each tribe including many genera. The British Museum alone possesses eighty genera. The Vampire Bat is a native of South America, where it is very common, and held in some dread. It lives on the blood of animals, and sucks usually while its victim sleeps. The extremities, where the blood flows freely, as the toe of a man, the ears of a horse, or the combs and wattles of fowls, are its favorite spots. When it has selected a subject, on which it intends to feed, it watches until the animal is fairly asleep. It then carefully fans its victim with its wings while it bites a little hole in the ear or shoulder, and through this small aperture, into which a pin's head would scarcely pass, it contrives to abstract sufficient blood to make a very ample meal. The wound is so small, and the bat manages so adroitly, that the victim does not discover that anything has happened until the morning, when a pool of blood betrays the visit of the vampire.

The wound made by the bat's teeth is no larger than that made by a needle, and hardly penetrates the skin, so that the blood must be extracted by suction. There have been very different accounts of the vampires from travellers, some denying that they suck the blood at all, and others narrating circumstantially the injuries inflicted upon their own persons. The cause for these discrepancies is probably owing to the constitution of the narrators, there being some persons whom a vampire will not touch, while others are constantly victimized. This bat is placed among the Phyllostomina, because the membrane on its nose resembles a leaf. The length of its body is about six inches.

The LONG-EARED BAT is found in most parts of Europe, and is common in England. It may be seen any warm evening flying about in search of insects, and uttering its peculiar shrill cry. The ears are about an inch and a half in length, and have a fold in them reaching almost to the lips, from which peculiarity the genus is called *Plecotus*. This bat is very easily tamed, and will take flies and other insects from the hand. One that I had in my own possession used to hang by the wing-hooks during the whole of the day, and could hardly be persuaded to move, or even to eat; but when the evening came on it became very brisk indeed, and after carefully combing itself with its hind feet, it would eagerly seize a fly or beetle and devour it, always rejecting the head, legs, and wings. It was then very impatient to be released from the cage, and would show its uneasiness by climbing about the cage and fluttering its wings. It unfortunately died before further investigations could be made, but during the short time that it survived, it seemed very gentle, and only bit me once, although I used frequently to handle it. When



THE KING OF BEASTS.

the long-eared bat is suspended by its hinder claws, it assumes a most singular aspect. The beautiful long ears are tucked under its wings, which envelop a great part of its body. The tragus, or pointed membrane visible inside the ear, is then exposed, and appears to be the actual ear itself, giving the creature a totally different cast of character.

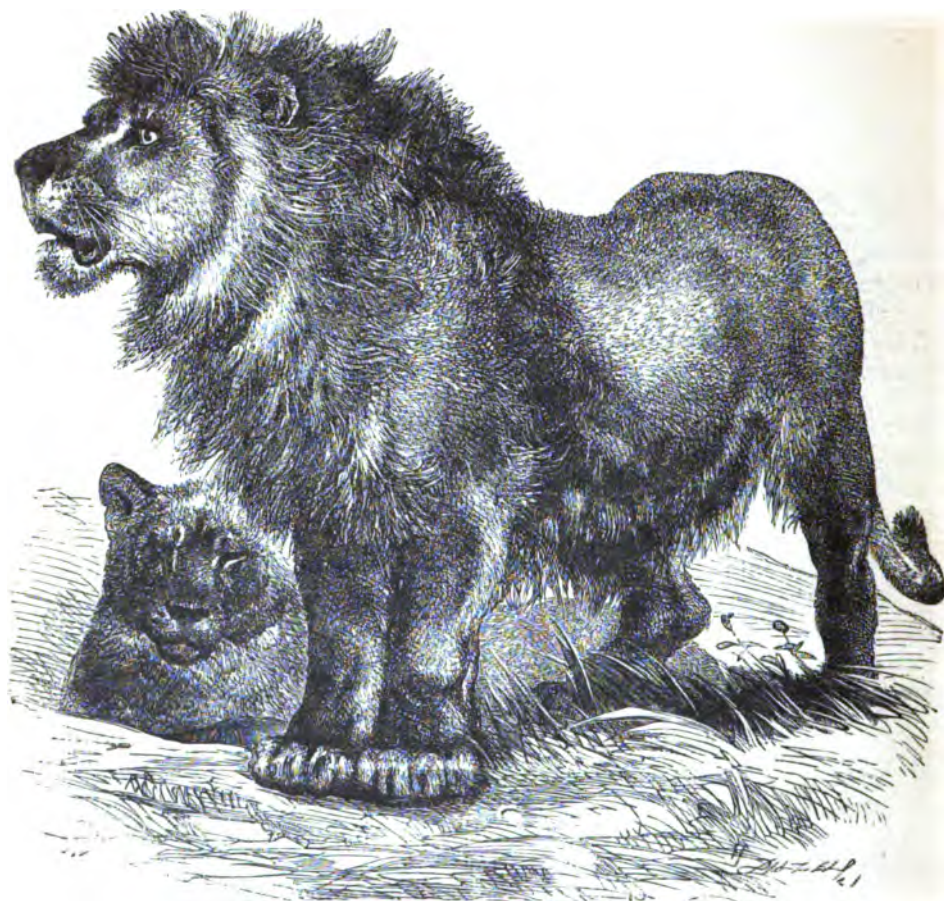
QUADRUPEDS.

The former sections have been characterized by the number and properties of the *hands*. In the section that we are about to consider, the hands have been modified into feet. At the head of the quadrupeds, or four-footed animals, are placed, the carnivora, or flesh-eaters, and at the head of the carnivora, the Felidæ, or cat kind, are placed, as being the most perfect and beautiful in that section. The Felidæ all take their prey by creeping as near as they can without observation, and then springing upon their unfortunate victim, which seldom succeeds in making its escape, as the powerful claws and teeth of its enemy usually dash it insensible to the ground. The jaws and teeth of the Felidæ are very different from those of the animals already described; their jaws are more powerful, and their teeth longer and sharper. Their claws, too, are necessarily very long, curved, and sharp, and to prevent them from being injured by coming into contact with the ground, they are retracted, when not in use, into a sheath, which effectually guards them and keeps them sharp. There are five claws on the fore-feet, and four on the hinder feet.

The tongue of the Felidæ is very rough, as may be proved by feeling the tongue of a cat. This roughness is occasioned by innumerable little hooks which cover the tongue, point backward, and are used for the purpose of licking the flesh off the bones of their prey. The bristles of the mouth, or whiskers, are each connected with a large nerve, and are exceedingly useful in indicating an obstacle when the animal prowls by night. Their eyes are adapted for nocturnal vision by the dilating power of the pupil, which expands so as to take in every ray of light.

The LION stands at the head of the wild beasts. His noble and dignified bearing, the terrific power compressed into his comparatively small frame, and the deep majesty of his voice, have gained for him the name of "king of beasts." The lion inhabits Africa and certain parts of Asia, such as portions of Arabia and Persia and some parts of India. It varies in external appearance according to the locality, but there is little doubt that there is but one species. The roar of the lion is one of its chief peculiarities. The best description of it is in Gordon Cumming's "Adventures":

"One of the most striking things connected with the lion is his voice, which is extremely grand and peculiarly striking. It consists, at times, of a low, deep moaning, repeated five or six times, ending in faintly audible sighs; at other times he startles the forest with loud, deep-toned, solemn roars, repeated five or six times in quick succession, each increasing in loudness to the third or fourth, when

THE LION.—*Leo Barbarus.*

his voice dies away in five or six low, muffled sounds, very much resembling distant thunder. At times, and not unfrequently, a troop may be heard roaring in concert, one assuming the lead, and two, three, or four more regularly taking up their parts like persons singing a catch."

"As a general rule lions roar during the night, their sighing moans commencing as the shades of evening envelop the forest, and continuing at intervals throughout the night. In distant and secluded regions, however, I have constantly heard them roaring loudly as late as nine or ten o'clock on a bright, sunny morning.

In hazy and rainy weather they are to be heard at every hour in the day, but their roar is subdued."

The opinion that lions will not touch a dead animal is erroneous, as they were frequently shot by Mr. Cummings while devouring gnoos, etc., that had fallen by his rifle. Those lions who have once tasted human flesh are generally the most to be dreaded, as they will even venture to spring in among a company of men, and seize their victim. These lions are called Man-eaters.

The Lioness is much smaller than the lion, and is destitute of the magnificent mane which is so great an ornament to her mate. As a general rule she is more fierce and active than the male, especially before she has had cubs, or while she is suckling them. She has usually from two to four cubs at a time. They are beautiful, playful little things, and are slightly striped. They have no mane until about two years old. While her cubs are small, the lioness knows no fear, and will attack a company of men, or a herd of oxen, if they come too near her den. The cubs are remarkably heavy for their age. Many years ago I had a pair of young lion cubs in my hands. They were about the size of very large cats, but weighed considerably more than their size led me to believe. They were playful little animals, but struck rather too hard to be agreeable.

The lion when young is easily tamed, and shows a strong attachment to its keeper. Those who have seen Van Amburg will know what influence man may obtain over this powerful creature. There is one remarkable difference in the characters of the feline and canine tribes. If a man is overcome by a wolf or a dog, the animal ceases not to mangle its vanquished foe until life is quite extinct. A dog killing a rat is a good instance of this trait of character. But if a lion or any other feline animal vanquishes a man, it contents itself with the victory for some time without making any attempt to injure him, unless he tries to escape, in which case he is again dashed to the earth, and probably considerably bitten as a warning. A cat treats a mouse just as a lion treats a man. This propensity in the lion has been the cause of saving several lives, the men having been able either to destroy their foe by cautiously getting out a weapon, or by lying still until they were succored.

At the extremity of the lion's tail there is a small hook or claw, which has been represented as the means by which the animal lashes itself into fury, using it as a spur. This is impossible, as the claw or prickle is very small, not fixed to the bone as the claws of the feet are, but merely attached to the skin, and falls off if roughly handled. It is not present in all lions, as Mr. Wood only discovered it once out of numerous specimens which he examined.

The TIGER is found only in Asia, Hindostan being the part most infested by it. In size it is almost equal to the lion, its height being from three to four feet, and its length rather more than eight feet. It has no mane, but to compensate for this deficiency, it is decorated with black stripes, upon a ground of reddish

yellow fur, which becomes almost white on the under parts of the body. The chase of the tiger is among the most exciting and favorite sports in India. A number of hunters assemble, mounted on elephants trained to the sport, and carry with them a supply of loaded rifles in their howdahs, or carriages mounted on the elephants' backs. Thus armed, they proceed to the spot where a tiger has been seen. The animal is usually found hidden in the long grass or jungle, which is frequently eight or more feet in height, and when roused, it endeavors to creep away under the grass. The movement of the leaves betrays him, and he is checked by a rifle ball aimed at him through the jungle. Finding that he cannot escape without being seen, he turns round and springs at the nearest elephant, endeavoring to clamber up it, and attack the party in the howdah. This is the most dangerous part of the proceedings, as many elephants will turn round and run away, regardless of the efforts of their drivers to make them face the tiger. Should, however, the elephant stand firm, a well-directed ball checks the tiger in his spring, and he then endeavors to again escape, but a volley of rifle-balls from the backs of the other elephants, who by this time have come up, lays the savage animal prostrate, and in a very short time his skin decorates the successful marksman's howdah.

Tigers are usually taken by the natives in pitfalls, at the bottom of which is planted a bamboo stake, the top of which is sharpened into a point. The animal falls on the point, and is impaled. The general notion that tigers cannot be tamed is erroneous. They can be tamed as easily as the lion; but great caution must be used with all wild animals, as in a moment of irritation their savage nature breaks out, and the consequences have more than once proved fatal. The coloring of the tiger is a good instance of the manner in which animals are protected by the similarity of their external appearance to the particular locality in which they reside. The stripes on the tiger's skin so exactly assimilate with the long jungle grass among which it lives, that it is impossible for unpractised eyes to discern the animal at all, even when a considerable portion of its body is exposed.

The LEOPARD is an inhabitant of Africa, India, and the Indian Islands. A black variety inhabits Java, and is not uncommon there. Its height is about two feet. This and the following *Felidæ* are accustomed to live much on trees, and are on that account called tree-tigers by the natives. Nothing can be more beautiful than the elegant and active manner in which leopards sport among the branches of the trees: at one time they will bound from branch to branch with such rapidity, that the eye can scarcely follow them; then, as if tired, they will suddenly stretch themselves along a branch, so as to be hardly distinguishable from the bark, but start up again on the slightest provocation, and again resume their graceful antics. It is easily tamed, and expresses great fondness for its keeper, and will play with him like a cat. A remarkably beautiful specimen in Wombwell's Menagerie was exceedingly fond of playing with the tuft at the extremity of the lion's tail, and from the familiar manner in which he patted and bit it, he evidently considered

it as manufactured for his own particular entertainment. This animal is exceedingly fond of some scents, especially preferring lavender water, by means of which predilection it has been taught to perform several tricks. The Leopard and Panther are considered as the same animal, on the authority of Mr. Gray.

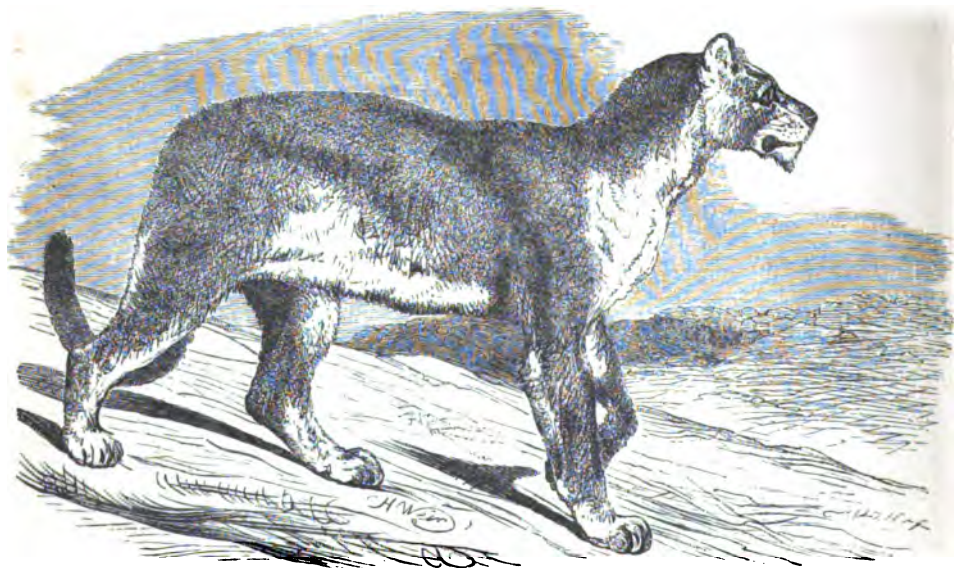
The JAGUAR inhabits America. It is larger and more powerful than the leopard, which it resembles in color, but has a black streak across the chest, and a



JAGUAR — *Leopardus Onca*.

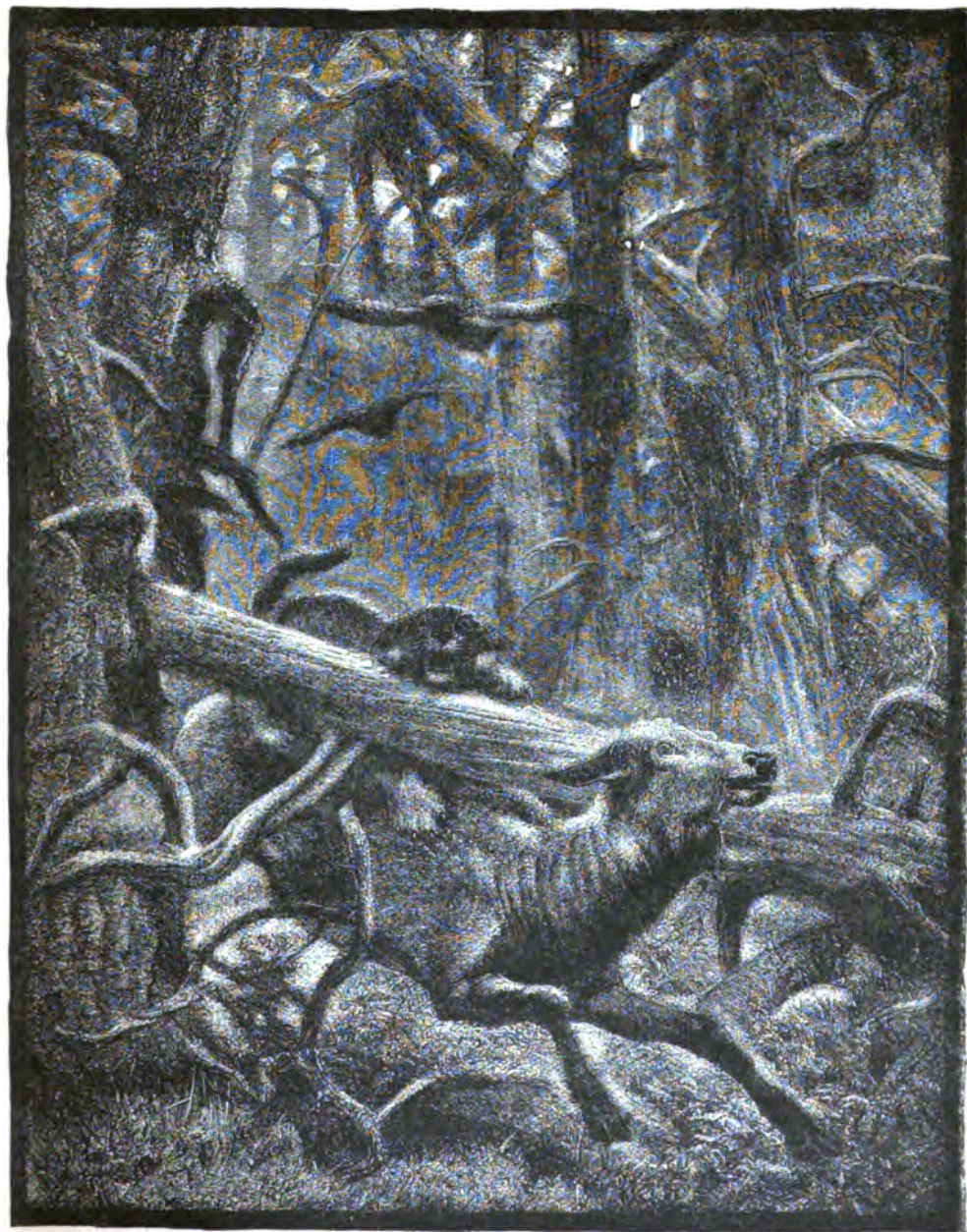
black spot in the centre of the rosettes. It is fond of climbing trees, and finds little difficulty in ascending, even when the trunk is smooth and destitute of branches. It chases monkeys successfully, and is said to watch for turtles on the beach, and to scoop out their flesh by turning them on their backs and inserting its paws between the shells. Nor does it confine its attention to the turtles themselves, for it watches them lay their eggs, and then scoops them out of the sand with its claws. It often makes fearful havoc among the sheep-folds, and is said to depart so far from the usual habits of the Felidæ, as to enter the water after fish, and to capture them in the shallows by striking them out of the water with a blow of its paw. There have been instances of the domestic cat acting in the same manner. When it captures one of the larger animals it destroys it by leaping upon its back, and twisting the head of its prey round until the neck is dislocated.

The PUMA, or Mountain Lion, inhabits the whole of America, where it is held in much dread by the natives. Its color is a uniform gray, fading into white on the under parts of its body, and this similarity of color is the reason that the name



PUMA.—*Leopardus Concolor*.

“concolor” has been given to it. It lives much on trees, and usually lies along the branches, where its uniform dusky fur renders it so like the bark that it can scarcely be distinguished from the branch. Americans always speak of this animal as the panther, or “painter,” as it is more familiarly pronounced; and many authors still

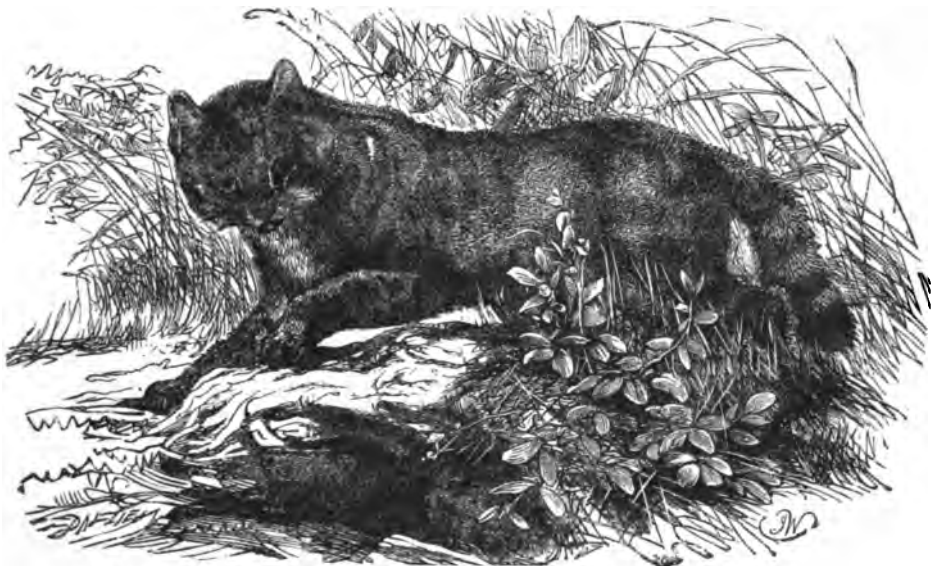


PUMA AND PREY.

term it the *cougar*, a word contracted from the original elongated unpronounceable Mexican name, "Gouazouara."

The OCELOT, one of the Tiger-cats, is a native of Mexico and Peru. Its height is about eighteen inches, and its length about three feet. It is a most beautiful animal, and is easily tamed. When in a wild state it lives principally on monkeys, which it takes by stratagem.

The domestic CAT was formerly supposed to be the same animal as the wild cat,



WILD CAT.—*Felis Catua*.

but it is now proved to be a distinct species, and the difference is seen at once by the form of the tail. That of the domestic cat is long and taper, while that of the wild cat is bushy and short.

The cat is familiarly known to us as a persevering mouse-hunter. So strong indeed is the passion for hunting in the breast of the cat, that she sometimes disdains mice "and such small deer," and trespasses on warrens or preserves. A large tabby cat was accustomed to go out poaching in the preserves of a neighboring nobleman, and so expert was she at this illegal sport that she constantly returned bearing in her mouth a leveret or a partridge, which she insisted on presenting to her mistress, who in vain endeavored



CATS' TAILS.*

* 1, Tail of Domestic Cat; 2, Tail of Wild Cat.

to check her marauding propensities. These exploits, however, brought their own punishment; for one day, when in the act of seizing a leveret, she found herself caught in a vermin trap, which deprived her of one of her hind legs. This misfortune did not damp her enthusiasm for hunting, as although the loss of a leg prevented her from chasing hares, and such-like animals, she would still bring in an occasional rat.

This instinctive desire of hunting seems to be implanted in cats at a very early age. I have seen kittens but just able to see bristle up at the touch of a mouse, and growl in a terrific manner if disturbed.

The cat displays a great affection for her kittens, and her pride when they first run about is quite amusing. While I was undergraduate at college, a cat belonging to the baker's department formed a great friendship for me, and used to come every morning and evening to obtain her share of breakfast and tea. She continued her attention for some time, but one morning she was absent from her accustomed corner, nor did she return until nearly a week had passed, when she came again, but always seemed uneasy unless the door was open. A few days afterward she came up as usual, and jumped on my knee, at the same time putting a little kitten in my hand. She refused to take it back again, so I restored it to its brothers and sisters myself. A few hours afterward, on going into my bedroom, I found another black kitten fast asleep on the bed.

Cats are very fond of aromatic plants and several powerful scents. My own cat has just been discovered in the act of eating the green tops of a musk plant that was standing in the window. Valerian appears to be the great attraction for cats; and any one who is disposed to place a plant of valerian in his garden must beware of the cats, for they will come in numbers, roll over it, and scratch up the plant until there is not a vestige of it left. Moreover they will fight for the fragments in various parts of the garden, and cause great confusion among the seeds. There are several varieties of the domestic cat, among which the Angora cats, with their beautiful long fur, and the Manx cats of the Chartreuse breed, which have no tails, are the most conspicuous.

The LYNXES are remarkable for the pencil of hairs which tufts their sharply pointed ears. The CANADA LYNX is a native of North America, and is remarkable for its gait. Its method of progression is by bounds from all four feet at once, with the back arched. It feeds principally on the American hare, as it is not courageous enough to attack the larger quadrupeds. Its length is about three feet. The Indians sometimes eat its flesh, which is white and firm, and not unlike that of the American hare itself. Its skin forms an important article of commerce, and between seven and nine thousand are imported yearly by the Hudson's Bay Company.

The CHETAH, or HUNTING LEOPARD, as it is sometimes called, is one of the most elegant and graceful animals known. It is a native both of Africa and India, but it is only in the latter country that it is used for hunting game, as the Africans





CANADA LYNX.

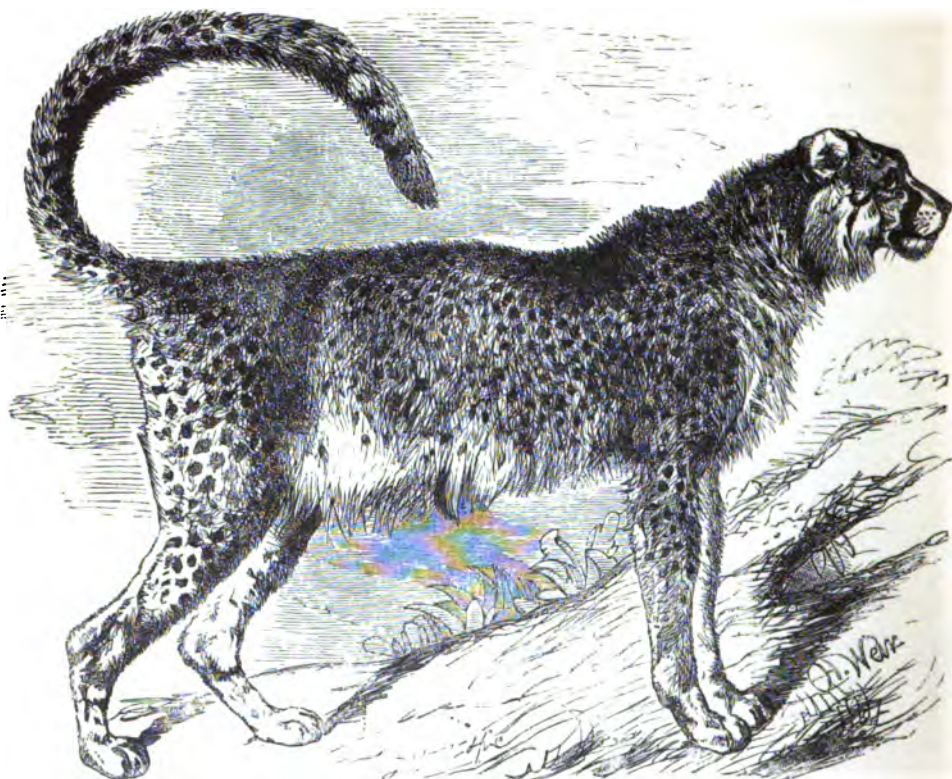
appear not to possess sufficient ingenuity to train the animal. The method of employing it is usually as follows: The chetah is either led blindfolded in a chain, or placed in a hackery, or native cart, and taken as near as possible to the place where antelopes or deer are feeding. When close enough, the hunter takes the band from its eyes, and directs its head toward the game. Directly the chetah sees the deer, it creeps off the cart, and makes toward them as rapidly and silently as it



EUROPEAN LYNX.—*Lynx virgatus*.

can, carefully availing itself of the accidental cover of a bush, or stone, precisely as a cat does when stealing after a bird. When it has succeeded in unobservedly approaching the unsuspecting herd, it makes two or three tremendous springs, and fastens on the back of one unfortunate deer, brings it to the ground, and waits until its keeper comes up, who induces it to leave its prey by a ladleful of the blood, which he takes care to have ready. The chetah is then hooded and led back to his cart. It is so easily tamable and so gentle that it is frequently led about the streets by a string for sale.

It is rather larger than the leopard, and differs from it in the length of its paws, its inability to climb trees, and the crispness of its fur. It is therefore placed in a different genus from the leopard. It derives its name of "jubata" from a thin mane running down the neck.

CHETAH.—*Gueparda subata.*

The HYE.NINA, or HYE.NAS, are remarkable for their predatory, ferocious, and withal cowardly habits. There are several hyenas, the striped, the spotted, and the villose, but as the habits of all are very similar, only one will be mentioned. The hyenas, although very repulsive in appearance, are yet very useful, as they prowl in search of dead animals, especially of the larger kinds, and will devour them even when putrid, so that they act the same part among beasts that the vultures do among birds, and are equally uninviting in aspect. They not unfrequently dig up recently interred corpses, and in Abyssinia, according to Bruce, they even flock in numbers into the village streets, where they prey on slaughtered men who are thrown out unburied. One of these animals attacked Bruce in his tent, and was only destroyed after a severe battle. Their jaws and teeth are exceedingly powerful, as they can crush the thigh-bone of an ox with apparently little effort; and so great

is the strain upon the bones by the exertions of these muscles, that the vertebræ of the neck become ankylosed, as it is called, that is, become united together, and the animal has a perpetual stiff neck in consequence. Before the anatomy of the hyena was better known, people thought that it had only one bone in its neck. The skull too is very strong, and furnished with heavy ridges for the support of the muscles which move the jaw.

The hinder parts of the hyena are very small, and give it a strange shambling appearance when walking. The hyena is easily tamed, and even domesticated, so that the tales of its untamable disposition are entirely erroneous. The striped hyena is found in many parts of Asia and Africa, where it is both a benefit and a pest, for when dead animals fail it, the flocks and herds are ravaged, and even man does not always escape.

The VIVERRINA, or CIVETS, are active little animals, averaging about two feet in length. The whole group is celebrated for the perfume which is secreted in a glandular pouch near the tail, and is of some importance in commerce. The civet



CIVET.—*Viverra Civett.*

is only found in North Africa, especially in Abyssinia, where it takes up its abode on uncultivated and barren hills. It feeds upon birds and the smaller quadrupeds, which it takes by surprise.

The ICHNEUMONS, or MANGOUSTS, well deserve their name of Creepers, for with

their long bodies and snouts, their short limbs and slender tails, they insinuate themselves into every crevice in their way in search of their expected food. Few animals are more useful than the ichneumons. Snakes, lizards, crocodiles' eggs,



ICHNEUMON.—*Herpestes Ichneumon*.

or even young crocodiles themselves, form their principal food, and their activity is so great that, when these sources fail, they are able to secure birds, and even seize upon the swift and wary lizards, which, when alarmed, dart off like streaks of green light glancing through the bushes. The Egyptian Ichneumon, or Pharaoh's Rat, as it is sometimes called, is a native of North Africa, and is often domesticated for the purpose of destroying the various snakes, and other reptile annoyances, which are such a pest in the houses of hot countries. Its length without the tail is about eighteen inches.

We now arrive at the Dog Family, which includes the Dogs, Wolves, Jackals, and Foxes. The first of the Dogs is the KOLSUN, or DHAE, which inhabits Bombay and Nepaul. It hunts in packs, as most of the dogs do even in a wild state, and has been known to destroy tigers and chetahs. Let us pass to a more interesting animal, the NEWFOUNDLAND DOG. This magnificent creature was originally brought from Newfoundland. It is often confounded with the LABRADOR DOG, a larger and more powerful animal. Both these dogs are trained by their native masters to draw sledges and little carriages, and on that account are highly esteemed. The Newfoundland dog is well known as a most faithful guardian of its master's property. It is remarkably fond of the water, and will fetch out any article that its master indicates, and lay it at his feet. Many instances are known of this noble animal saving the lives of people that had fallen into the water, and must have perished but for its timely aid. This is one of the largest of the dogs, as it stands nearly two feet two inches in height.

The BLOODHOUND.—There are several varieties of this animal, inhabiting Cuba, Africa, England, and America. They all are endowed with a wonderfully acute sense of smell, and can trace a man or animal with almost unerring certainty. The Cuban bloodhound was formerly employed by the Spaniards to hunt down the natives while endeavoring to escape from their invasions. A few years since, one of

these dogs saved the life of its master, an American hunter, by boldly attacking a puma which had sprung on him in the darkness, and was lacerating him in a dreadful manner. The sagacious animal had been tied up at home, but apparently knowing the dangers of the forests through which his master was about to pass, he broke his chain, and arrived barely in time to save the hunter from a horrible death.

The FOXHOUND and BEAGLE are not very dissimilar in form or habits. They both follow game by the scent, and are used in hunting. The foxhound, as its name implies, is used for hunting the fox, and enters into the sport with extraordinary eagerness. The height of the foxhound is about twenty-two inches.

The beagle is used principally for hare hunting. It is much smaller than the foxhound, and not nearly so swift, but its scent is so perfect that it follows every track of the flying hare, unravels all her windings, and seldom fails to secure her at last. Sportsmen usually prefer the smallest beagles obtainable. The most valuable pack of these dogs known used to be carried to and from the field in a pair of panniers slung across the horse's back. Unfortunately, this pack was so well known that numerous were the attempts to gain possession of it. One ill-fated evening as the dogs were returning in their panniers after the day's sport, the keeper was decoyed away by some stratagem, and when he returned, his dismay was great to find that the dogs, panniers, and horse were all missing. No traces of them were discovered, and it was conjectured that they must have been sold. It is a common custom in military schools, and sometimes at the universities, to follow the beagle on foot. There has been for several years a society who thus hunt on foot. As too much time would be lost in looking for a living hare, a dead rabbit is trailed along the ground, and as its fur has been rubbed with aniseed the dogs can follow it easily.

The POINTER is used by sportsmen to point out the spot where the game lies. It ranges the fields until it scents the hare or partridge lying close on the ground. It then remains still as if carved in stone, every limb fixed, and the tail pointing straight behind it. In this attitude it remains until the gun is discharged, reloaded, and the sportsman has reached the place where the bird sprang.

The group of the MASTIFF dogs is distinguished by the shortness of the nose and the breadth of the head. This group includes the mastiff, the bull-dog, and the almost obsolete absurd little pug-dog. The breadth of their heads is caused by the large muscles which move the jaw.

The English mastiff is generally employed as a house-dog, as its powerful frame and deep voice are well fitted to scare away marauders, or to repel them if they approach too near. It is by far the most sagacious of the whole group, and exhibits much more attachment to its master than the others. This animal has been called by several names, of which "Ban-dog" is the best known. Bewick thinks that the ban-dog is a separate species, of a lighter make than the ordinary English mastiff.

The BULL-DOG is proverbial for courage and endurance. Unfortunately its social qualities are by no means pleasing, as, although it has some attachment to its master, yet it is not always safe for him to disturb it. This dog was extensively



BULL-DOG.—*Canis familiaris*.

used in the cruel sport of bull-baiting, a recreation now extinct. When opposed to the bull, the dog would fly at its nose, and there hang in spite of all the infuriated animal's struggles.

The TERRIERS never grow to any considerable size. There are several breeds of terriers, among which the English and Scotch are most conspicuous. These dogs are principally used for destroying rats or other vermin, and are so courageous that they do not hesitate to unearth the fox or badger. Otters are also hunted by them,

but prove by no means an easy prey, as their snake-like body, sharp teeth, and amphibious habits, render them very difficult to seize, and their tenacity of life will frequently enable them to escape when the dog considers them dead. Terriers are extremely attached to their master, and are capable of learning many amusing tricks.

The SHEPHERD'S DOG is a rough, shaggy animal, with sharp pointed ears and nose. It is an invaluable assistant to the shepherd, as it knows all its master's sheep, never suffers them to stray, and when two flocks have mixed, it will separate its own charge with the greatest certainty. It understands every look and gesture of its beloved master, and drives the flock to any place which he points out.

The GREYHOUND is the swiftest of all the dogs, and is principally used in the pursuit of the hare, which amusement is termed coursing. It has but little delicacy in scent, and hunts almost entirely by sight. The hare endeavors to baffle it by making sharp turns, which the dog cannot do on account of its superior size, and has therefore to take a circuit, during which the hare makes off in another direction. The hare also has the property of stopping almost instantaneously when at full speed. It puts this manœuvre into force, when it is nearing its favorite hiding-place.

It induces the dog to spring upon it, and then suddenly checks itself. The dog is carried twenty or thirty yards away by its own momentum, and the hare springs off to her place of refuge.

PRAIRIE DOG.—The title of Prairie Dog has been given to this animal on account of the sharp yelping sound which it is in the habit of uttering, and which has some resemblance to the barking of a very small and very peevish lap-dog. Every time it yelps it gives its tail a smart jerk. This peculiar sound is evidently employed as a cry of alarm; for as soon as it is uttered all the prairie dogs dive into their burrows, and do not emerge again until they hear the shrill whistle which tells them that the danger is past.

The burrows of the prairie dog are generally made at an angle of forty degrees, and after being sunk for some little distance run horizontally, or even rise toward the surface of the earth. It is well known that these burrows are not only inhabited by their legitimate owners and excavators, but are shared by the burrowing owl and the rattlesnake. According to popular belief, the three creatures live

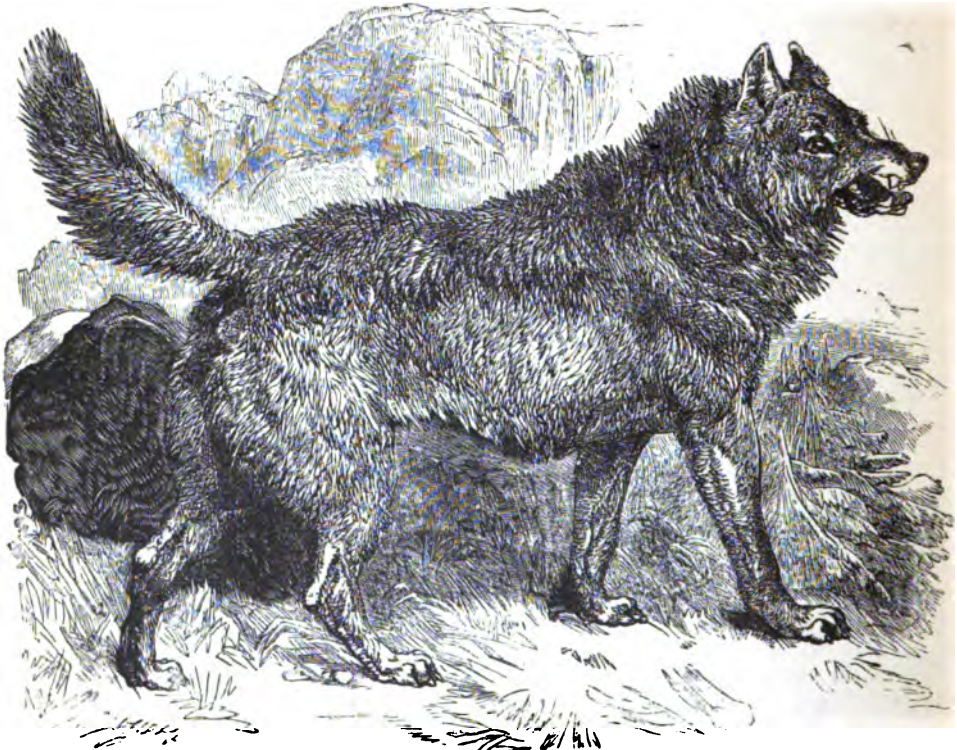


PRAIRIE DOG, OR WISH-TON-WISH.—*Spermophilus Ludovicianus*.

very harmoniously together; but careful observations have shown that the snake and the owl are interlopers, living in the burrows because the poor owners cannot turn them out, and finding an easy subsistence on the young prairie dogs. A rattle-

snake has been killed near a burrow, and when the reptile was dissected, a prairie dog was found in its stomach.

WOLF.—The wolf looks much like a large shaggy dog, and it has been thought by many that the first dogs sprung from wolves. When taken young the wolf may



WOLF.—*Canis lupus*.

be tamed, and it shows as much love for its master as the dog does. The wolf is very swift, and hunts deer and other animals in packs. It is sly and stealthy, and often prowls about lonely farms, to catch stray sheep, calves, pigs, or fowls, but is also cowardly and is easily frightened off by the barking of a dog or the sound of a gun. But when pressed by hunger it becomes dangerous, and will attack horses and oxen, and even men. In hard winters packs of hungry wolves come down from the forests of the Alps and other mountains in Europe and commit great ravages; and many terrible stories have been told of travellers who have been chased

by them in great forests, especially in Russia and Siberia. In one case a man and his wife, who were riding in a sleigh through the woods, were so hard pressed by wolves that they saved themselves only by throwing out their children, one by one, to be devoured by the hungry beasts. It is said that in Russia more than two hundred human beings are killed by wolves every year, and a great many thousands of cattle and sheep.

The GRAY WOLF of North America is usually gray above and yellowish gray below, but is sometimes nearly white. It is three to four feet long, with a tail about a foot and a half long. Packs of these wolves follow the buffalo herds on the western plains, feeding on the sick and straggling ones. They also attack horses, and sometimes men, when very hungry. They were once plentiful in New England and the other Eastern States, but now only a few are found in mountainous and thickly wooded parts.

In 1739 Israel Putnam, who afterward became so well known as General Putnam of the Revolutionary War, began life as a farmer in the town of Pomfret, Connecticut, forty miles east of Hartford. That part of the State was then quite wild, and the wolves were so troublesome that they killed seventy of his sheep in one night. The mischief was all done by one old she wolf and her cubs, who had lived in the woods near there for several years. The hunters killed the cubs, but the old one was too wary to be caught. She was at last driven by bloodhounds into a den about three miles from Putnam's house. The hunters tried to smoke her out by burning straw and brimstone in the mouth of the cave, but the wolf would not come out, and Putnam, tired of waiting any longer, for it was then ten o'clock at night, took a blazing torch in his hand and went down the hole, which was only high enough for him to crawl on his hands and knees. He had a rope tied round his legs, and told his friends to pull him up when he gave a signal. He crawled along more than thirty feet, or six times a man's length, without seeing anything; but all at once he saw at the end of the cave the glaring eyeballs of the wolf. She gnashed her teeth and gave a sudden growl, and his friends, who heard it, pulled him out so quickly that his shirt was torn to strips and his skin badly cut. He then loaded his gun with buckshot, and taking it in one hand and a torch in the other, went down again. As soon as he came near the wolf, she growled and made ready to spring on him, but he shot her quickly in the head, and was hauled out again nearly deaf with the noise, and choked with the smoke. After the smoke had cleared away, he crawled down a third time, took the dead wolf by the ears, and the two were pulled out by the people above with much joy.

The Indians catch many gray wolves in traps, and also kill many by surrounding them in a circle, which they make smaller, little by little, until they get near enough to shoot them.

The PRAIRIE WOLF, which the Mexicans call *coyote*, is smaller than the gray wolf, and is much like the jackal. The true wolf has a howl like that of a dog, but

the prairie wolf has only a kind of snapping bark, whence it is sometimes called the barking wolf. It lives in burrows on the great Western plains, is very swift, and hunts in packs.

The wolf is a mammal of the order *carnivora*, or flesh-eating animals, and of the dog family.

THE FOX.—This terror of hen-roosts and delight of sportsmen is found in most parts of America, and many other countries. It varies very much in color and size, according to the country where it lives. The habits of this animal are mostly nocturnal. It lies by day concealed in its burrow, if it be fortunate enough to possess one, or in the depth of some thicket, if it is not a householder. Toward evening it sallies out in search of food, and woe to the unfortunate hare, rabbit, pheasant, or fowl that comes in its way.

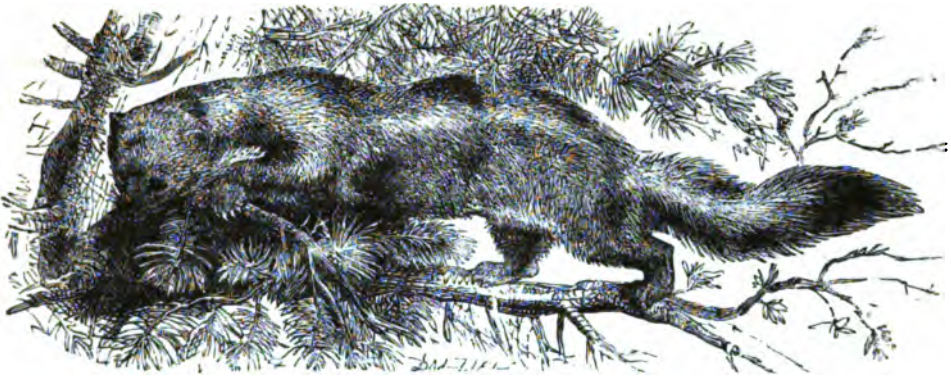
Sometimes he steals into the hen-roost, destroys and carries off most of its inmates, some of which he devours on the spot, others he carries home, and the remainder he buries for a future repast. When irritated, the fox gives out a strong, disagreeable scent, which lies so long on the ground that it may be perceived for nearly an hour after the fox has passed. Partly on this account, and partly on account of its speed, endurance, and cunning, the chase of the fox is one of the most admired of English sports.

THE MUSTELINA, or WEASELS, are easily distinguished by their long slender bodies, short muzzle, sharp teeth, and predatory habits. They inhabit almost every part of the world, and procure their food by creeping on their unsuspecting victim, generally a rabbit, rat, or bird, and then suddenly darting at it and piercing its neck with their sharp teeth. Almost all the weasels devour the brain and suck the blood of their prey, but seldom touch the flesh, unless they are pressed by hunger.

There are two kinds of MARTENS, named, from their favorite haunts, the Pine and the Beech Marten. Some naturalists assert that these two martens are not distinct animals, but only varieties of the same species. The Pine Marten is common in North America, where it is much too fond of chickens and ducklings to be a desirable neighbor. This animal, as well as the sable, is much sought after on account of its skin, which furnishes a beautiful fur, not much inferior to that of the sable.

THE STOAT, or ERMINE, is smaller than the polecat, but its habits are scarcely less predaceous. Hares and rabbits fall easy victims to their little enemy, who dispatches them with a single bite, penetrating the brain. During the winter the stoat becomes partially white, in northern countries wholly so, except the tip of the tail, which remains black. In this state it is called the ermine, and is killed in great numbers for the sake of its beautiful and valuable fur.

THE WEASEL is the least of this tribe. It is exceedingly useful to farmers, as it wages unrelenting war on rats and mice, and in an incredibly short space of time extirpates them from a barn or stack. It hunts by scent like dogs, and tracks the unfortunate rat with the most deadly certainty. It is a most courageous little an-

PINE MARTEN.—*Martes Abietum*.

imal, and will even attack men, who have found it by no means a despicable antagonist, as its instinct invariably leads it to dash at the throat, where a bite from its long, sharp teeth would be very dangerous.

The Rocky Mountain Weasel is the embodiment of watchfulness and agility. He skurries over the snow at a great pace when surprised, and, if the snow is light and feathery, shoots beneath the surface like a muskrat, coming up only at intervals.

THE BADGER.—This harmless and much injured animal (which is often subjected to such ill treatment that the term "badgering" a person is used to express irritating him in every possible way) lives at the bottom of deep burrows, which it excavates, and in which it passes all the day sleeping on a very comfortable bed of hay and grass. When the evening approaches it seeks its food, consisting of roots, fruit, insects, and sometimes young rabbits.

It is also said to attack the wild bee, and boldly devour the honey and combs, its thick hair and skin rendering it utterly regardless of the stings of the enraged bees, who "might as well attack a barber's block."

WEASEL.—*Mustela vulgaris*.

The cruel sport of baiting the badger is still continued, although not so openly or frequently as a few years back. The poor creature is placed inside a kennel, and dogs set at it, who are not unfrequently worsted by the badger, as its bite is terrific, and its skin so tough, and hair so thick, that the bites of the dogs do not take full effect. The power of the badger's bite is caused principally by the manner in which the under jaw is set on. Not only are its teeth sharp, and the leverage of its jaw powerful, but the jaw is so contrived that, when the creature closes its mouth, the jaw locks together as it were, and is held fast without much exertion on the part of the badger. Its skin is rather valuable, the hair being extensively employed in the manufacture of brushes, and its fur being in some request for holsters. The length of the badger is about two feet three inches.

The OTTER seems to play the same part in the water as the polecat and other weasels on the land. Like the polecat, it is excessively rapacious, and destroys many more creatures than it can devour; and as the polecat only eats the brain and sucks the blood, so the other daintily eats the flakes at the back of the fish's neck, and leaves the remainder for less fastidious animals.

It is extremely interesting to watch the actions of this almost amphibious creature. It slides noiselessly into the water, turns and twists about below the surface with the same or greater ease than a fish, then with a graceful sweep of the body it glides to the surface and ascends the bank with almost the same motion. While below the surface it bears a great resemblance to the seal, the method in which it disposes its hind feet greatly assisting the effect. Its rapid and easy movements in the water are mostly performed by the assistance of its powerful tapering tail.

The otter is easily tamed, and its predatory habits have been occasionally turned to account, as it is sometimes trained to catch fish and bring them to shore, precisely as the falcon is trained to catch terrestrial game. The Hindoos have brought the art of otter training to great perfection, and keep their otters regularly tethered with ropes and straw collars on the banks of the river.

The BEARS and their allies are mostly heavy, and walk with the whole foot placed flat on the ground, unlike the cats, dogs, etc., who walk with merely their paws or toes. All the bears are omnivorous—that is, they can eat either animal or vegetable food, so that a leg of mutton, a pot of honey, a potato, or an apple, are equally acceptable.

The BROWN BEAR inhabits the north of Europe, Switzerland, and the Pyrenees.

In olden times the bear used to be baited—that is to say, the bear was tied to a pole, and several dogs were set at him, the object being to see whether the bear could bite the dogs, or the dogs bite the bear with greater force; but this cruel sport is now happily extinct.

The GRIZZLY BEAR.—“Bernardin de St. Pierre said, ‘At the sight of man, all animals are struck either with love or fear.’ He forgot to mention a third impression made on many animals when they see a man, namely, ‘hunger, and a great de-

sire to eat him.'" This observation applies most fully to the grizzly bear, a native of North America. It is the most ferocious and powerful of its family, and is an animal which must either be avoided or fought, for there is no medium. If a griz-



GRIZZLY BEAR.—*Ursus ferox*.

zly (or, "Ephraim," as the creature is termed by hunters) once sees a man, it will probably chase him, and will do so with great perseverance. An American traveller told me lately that he had been chased nearly thirty miles by one of these bears, who would probably have kept up the chase as many miles more, had not my informant crossed a wide river, over which the bear did not choose to follow him.

The grizzly bear is marvellously tenacious of life. Sometimes, it is said, after a party of hunters have been combating one of these bears, it is impossible to find four square inches of sound skin in the animal's body, a ball through the brain or heart affording the only means of safety to the hunter. It is rather singular that

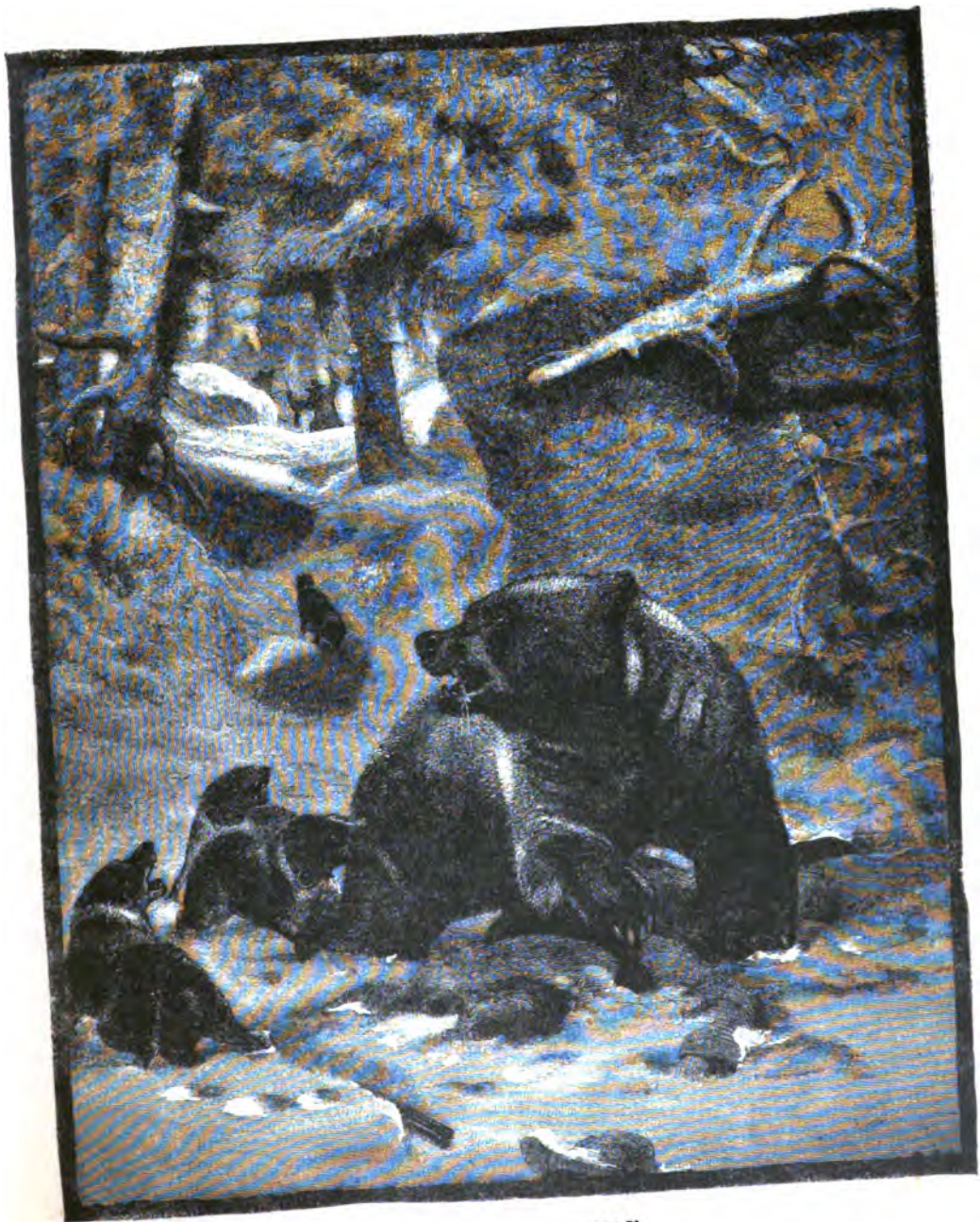
this bear has the power of moving each claw separately, as we move our fingers. It is able to overcome and carry off the enormous bison, and to dig a pit in which to bury it.

The POLAR or WHITE BEAR, called Nennook by the Esquimaux, lives in the Arctic regions, where it feeds on seals, fish, or even the walrus, but it dares not attack the latter animal openly. It is a formidable antagonist either by land or water, as it dives with great ease, and is able to chase the seal amid the waves. As the seals frequently crawl out of the water upon rocks or fragments of ice, the Polar bear is forced to swim after them ; but lest they should observe him he makes his approaches by a succession of dives, and contrives that the last dive brings him directly under the unsuspecting seal, who is immediately grasped and killed. Richardson states that these bears are often drifted from Greenland to Iceland on fields of ice, and that they find the flocks and herds so very delicious after a long course of seal diet, that the inhabitants are forced to rise in a body and put an end to their depredations. To give this animal, who is constantly running over fields of ice, a firm footing, the soles of its feet are thickly covered with long hair.



RACCOON.—*Procyon lotor*.

The RACCOON is an animal about the size of a large fox, and an inhabitant of Canada and other parts of America. It derives its name, *lotor*, from the habit it is said to possess of washing its food before eating it. Its skin is very valuable, and



"EPHRAIM" AT BAY.

is much sought after by American hunters. The food of the raccoon is principally small animals and insects. Oysters are also a very favorite article of its diet. It bites off the hinge of the oyster, and scrapes out the animal in fragments with its paws. Like a squirrel when eating a nut, the raccoon usually holds its food between its fore paws pressed together, and sits upon its hind quarters while it eats. Poultry are very favorite objects of its attack, and it is said to be as destructive in a farm-yard as any fox, for it only devours the heads of the murdered fowl. Like the fox, it prowls by night. When taken young it is easily tamed, but very frequently becomes blind soon after its capture. This effect is supposed to be produced by the sensitive state of its eyes, which are only intended to be used by night; but as it is frequently awakened by daylight during its captivity, it suffers so much from the unwonted glare, that its eyes gradually lose their sight.

A raccoon chased by a dog near a creek faced its pursuer on arriving on the bank. The dog seized him, but the raccoon was heavier than his assailant, and, setting his long, sharp teeth in the side of the dog's head, clasped him in his claws. The dog tried to shake off the raccoon, but was held fast. Then the dog turned to the creek and dragged the raccoon, which still clung to him, into the water, where he held him under, adroitly keeping his own nose out, till the raccoon became so exhausted that the dog shook him off, and seizing him by the throat, mastered him.

THE MOLE.—Many ridiculous stories of the mole and its habits may be found in several authors, among whom *Æsop* stands very conspicuous. This much maligned animal is said to be deprived of eyes, to undergo unheard-of tortures in forcing its way through the earth, and to spend a life of misery in subterranean damp and darkness. But so far from being a miserable animal, the mole seems to enjoy its life quite as much as any other creature. It is beautifully fitted for the station which it fills, and would be unhappy if removed from its accustomed damp and darkness into warmth and light.

The eyes of the mole are very small, in order to prevent them from being injured by the earth through which the animal makes its way; indeed, larger eyes would be useless underground. When, however, the mole requires to use its eyes, it can bring them forward from the mass of fur which conceals and protects them when not in use. The acute ears and delicate sense of smell supply the place of eyes. Its fur is very fine, soft, capable of turning in any direction, and will not retain a particle of mould. But the most extraordinary part of the mole is the paw or hand with which it digs. The two fore paws are composed of five fingers, armed with sharp, strong nails, in order to scrape up the earth; and to prevent the accumulated mould from impeding the mole's progress, the hands are turned outwardly, so as to throw the earth out of its way.

The mole is a most voracious animal, and is incapable of sustaining even a slight fast. Its principal food is the earth-worm, in chase of which it drives its long galleries underground; but it also will eat insects, bits of meat, and is said some-

times to catch birds, which it takes by surprise, and then rapidly tears to pieces with its powerful claws. This ravenous appetite causes it to suffer from thirst if a supply of water is not at hand. For this reason the mole always makes a tunnel toward a pond or brook, if there is one near. If no water is near, it digs a number of little wells, which receive the rain or dew, and enable it to quench its thirst.

It is a good swimmer, and can pass from bank to bank, or from the shore to an island, and when the fields are inundated by floods it can save itself by swimming. The construction of the mole's habitation is very singular and interesting. Each mole has its own habitation and hunting ground, and will not permit strangers to trespass upon its preserves, which it guards, not by "man-traps and spring-guns," but by its own claws and teeth.

In order to construct a fortress, the mole selects a secure place, as the foot of a tree, or the side of a high bank. It then throws up a heap of earth, which it presses firmly together, as within this mound its fortress has to be made. It commences by running a circular gallery near the summit of the mound, and another larger one near the bottom. These two galleries it connects by five descending passages. In the very centre of the mound, and at the level of the ground, it now digs a circular hole, which it connects with the upper gallery by three ascending passages. Lastly, it makes a number of passages from the lower gallery, and connects the circular chamber with the largest of them, or high-road, by a passage that first bends downward, and then rises into the high-road a little outside the large gallery. In the circular chamber the mole sleeps, and can escape into the high-road either by the upper gallery or by the road from the bottom of its dormitory.

I have already stated that each mole has its own hunting ground, and permits no intruder. If a strange mole should happen to trespass upon the domains of another, there would be a furious fight, and the conqueror would devour his vanquished foe. Although each mole has its own hunting ground, yet there are mostly high-roads, which connect the different hunting grounds with each other, and which are used by many individuals in common, the only precaution taken being that, if two moles should happen to meet, the weaker immediately retreats into one of the numerous side galleries which open from the high-road, and permits its aristocratical neighbor to pass.

All the passions of the mole seem to be furious. Even its passion for work, *i.e.* search after its food, has something fierce in it. The animal works desperately for several hours, and then rests for as many more. The country people say that it works at intervals of three hours each. The mode of burrowing by this animal is by rooting up the earth with its snout, and then scooping it away with its fore feet. I have often seen this operation performed. The depth at which this animal works depends almost entirely on the time of year. In the summer, the worms

come to the surface, and the mole accordingly follows them, making quite superficial runs, and sometimes only scooping trenches on the surface. But in the winter, when the worms sink deep into the ground, the mole is forced to follow them there, and as it cannot fast above an hour or two, it is forced to work at the comparatively hard and heavy soil, as it did in the light earth nearer the surface.



RADIATED MOLE, OR STAR-NOSED MOLE.—*Astromyces cristatus*.

Moles vary in color, the usual tint being a very deep brown, almost black, but they have been seen of an orange color, and a white variety is not uncommon. I have a cream-colored skin in my possession. There are several moles known—the Shrew Mole, the Changeable Mole, the Cape Mole, and the Star-nosed Mole are the most conspicuous.

THE SHREW-MOUSE.—This pretty little animal is very like the common mouse, but is easily distinguished from it by the length of its nose, which is used for grubbing up the earth in search of earth-worms and insects. The reader must not imagine that the shrew has any connection with the true mice. It belongs to an entirely different class of animals, its teeth being sharp and pointed, not unlike those of the mole and the hedgehog, whereas those of the mouse are broad and chisel-shaped like the teeth of the rabbit. A peculiar scent is diffused from these animals, which is possibly the reason why the cat will not eat them, although she will readily destroy them.

Many species of shrews are known, inhabiting various countries. There are, besides the common species, the Oared and the Water Shrew, all three inhabiting England. The formation of their hair, as seen under a powerful microscope, is very beautiful, but quite distinct from the hair of the mouse or rat. In the autumn, numbers of these little animals may be seen lying dead, but what causes this destruction is not known. This is one of the numerous animals that have suffered

by false reports, and have been treated with great cruelty on account of those fables. Rustics formerly believed that the poor little harmless creature paralyzed



HOARED SHREW, OR BLACK WATER SHREW.—*Crossopterus ciliatus*.

their cattle by running over them, and that the only way to cure the diseased animal was to place a bough of shrew-ash on the injured part. The shrew-ash was made by boring a hole into an ash-tree, and then plugging up in the hole a living shrew-mouse. By the same process of reasoning a shrew cut in half, and placed on a wound supposed to be caused by its bite, was considered a certain remedy.

The HEDGEHOG is one of the remarkable animals that are guarded with spikes. These are fixed into the skin in a very beautiful and simple manner. When the hedgehog is annoyed it rolls

itself up, and the tightness of the skin causes all its spines to stand firm and erect, bidding defiance to an unprotected hand. While rolled up, even the dog and fox are baffled by it; but their ingenuity enables them to overcome the difficulty by rolling it along until they push it into a puddle or pool, when the astonished hedgehog immediately unrolls itself to see what is the matter, and before it can close itself again is seized by its crafty enemy.

Many more fortunate animals have outlived the aspersions cast upon their character by ignorant persons, but the prejudice against the hedgehog is still in full vigor in the agricultural districts. Scarcely a farmer or laborer will be persuaded that the hedgehog does not suck the cows. Now, this is an impossibility for the hedgehog, but I have seen pigs—not hedgepigs, but real bacon pigs—suck the cows while lying down.

The food of the hedgehog consists, not of cow's milk, but insects, snails, frogs, mice, and snakes. Dr. Buckland placed a snake in the same box with the hedgehog. The hedgehog gave the snake a severe bite, and then rolled itself up, this process being repeated until the spine of the snake was broken in several places; it then began at the tail, and ate the snake gradually, as one would eat a radish. White has seen it bore down and eat the roots of the plantain, leaving the leaves and stem untouched. The flesh of the hedgehog is said to be good eating, and the gypsies frequently make it a part of their diet, as do the people in some parts of the Continent.

During the winter it lives in a torpid state, in a hole well lined with grass and moss, and when discovered looks like a round mass of leaves, as it has rolled itself among the fallen foliage, which adheres to its spikes. The engraving of the spine,



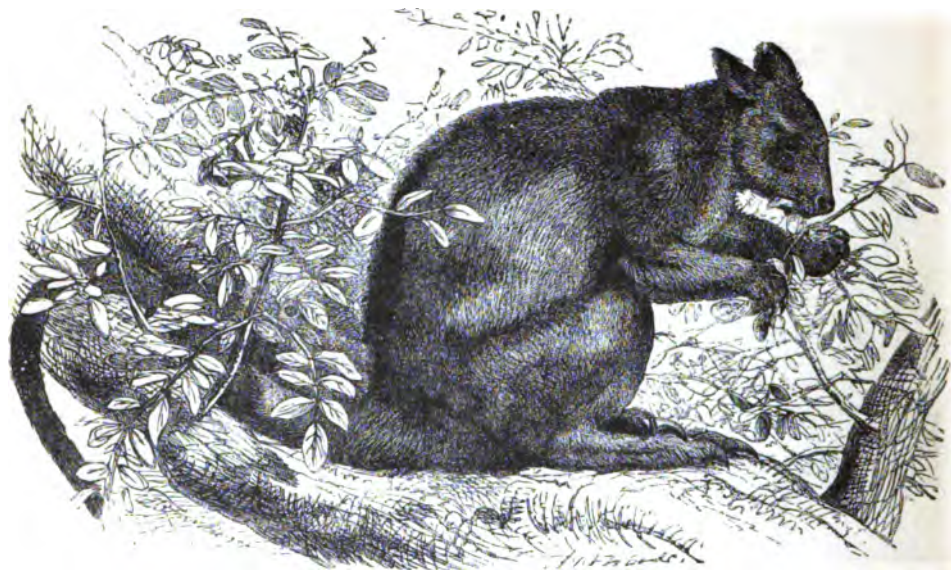
HEDGEHOG.—*Erinaceus Europæus*.

or quill, of this animal shows the method by which it is retained in the skin. The quill is as it were pinned through the skin, and retained by the head. The curvature is such that when the animal contracts itself, the quills are drawn upright, and form a strong and elastic covering, useful for more purposes than merely defence from foes. The hedgehog has been known to throw itself boldly from a considerable height, trusting to the elasticity of the spring for breaking its fall. It will be seen that when the spines are upright the shock of the fall would not tend to drive the end of the quill upon the animal, but merely spend its force upon the elasticity of the curved portion.



THE KANGAROO.—In the mole we saw that the power of the body was placed chiefly in the fore legs. We now come to a family which has the principal power placed in the hinder part of the body. In the kangaroos the hind legs are very long and immensely powerful; the fore legs are very small, and used more as hands than for walking; the tail also is very thick and strong, and assists the animal in its leaps.

The Great Kangaroo inhabits New Holland and Van Diemen's Land. Its singular formation, peculiarly adapted to the country, calls forth a corresponding degree of ingenuity on the part of the natives, who live much on its flesh. Its method of progression is by leaps from its long hind legs. The natural walking



TREE KANGAROO.—*Dendrologus ursinus*.

position of this animal is on all four legs, although it constantly sits up on the hinder legs, or even stands on a tripod composed of its feet and tail, in order to look out over the tops of the luxuriant grass among which it lives. The leaping movements are required for haste or escape, the length of each leap being about fifteen feet.

Hunting this animal is a very favorite sport with both colonists and natives. The natives either knock it down with the boomerang, spear it from behind a bush, or unite together and hem in a herd, which soon fall victims to the volleys of clubs, spears, and boomerangs which pour in on all sides. The colonists either shoot it or hunt it with dogs, a pack of which is trained for that purpose just as we train fox-hounds. The "old man," or "boomer," as the colonists call the great kangaroo, invariably leads the dogs a severe chase, always attempting to reach water and escape by swimming. It is a formidable foe to the dogs when it stands at bay, as it seizes the dog with its fore legs, and either holds him under water until he is drowned, or tears him open with a well-directed kick of its powerful hind feet,

which are armed with a very sharp claw. The female kangaroo carries its young about in a kind of pouch, from which they emerge when they wish for a little exercise, and leap back again on the slightest alarm. All the kangaroos and the opossums have this pouch, from which they are called "marsupiated" animals, from the Latin word *marsupium*, a purse or pouch.

The length of the great kangaroo is about five feet without the tail, which is about three feet long.

There are many species of kangaroo, the most extraordinary being the Tree Kangaroo, which can hop about on trees, and has curved claws on its fore paws, like those of the sloth, to enable it to hold on the branches.

THE OPOSSUM.—This animal inhabits North America, and is hunted with almost as much perseverance as the raccoon, not, however, for the sake of its fur, but of its flesh. When it perceives the hunter, it lies still between the branches, but if disturbed from its hiding-place, it attempts to escape by dropping among the herbage, and creeping silently away. It may often be seen hanging by the tail or by one or more of its feet, eating wild grapes or persimmons, or robbing birds' nests. In the night it usually prowls around looking for food. It lives chiefly on nuts, berries, and tender twigs and roots, but eats also insects, worms, birds, mice, and other small animals. It never digs in the ground, but builds its nest in the hollows of logs, and in holes at the roots of trees. Into these it will carry leaves and make itself a bed, when bad weather is coming on. Opossums get very fat in the autumn, and are then much prized for food in the Southern States, especially by the negroes, who take great delight in hunting them; but dogs will not eat them. Their flesh when cooked is much like roast pig. When attacked the opossum looks very fierce, snarls, growls, and will often bite, but if struck will make believe dead and will not stir even if it is hurt; but it will watch slyly and crawl away as soon as its enemy is gone. From this comes our phrase "to play 'possum."



OPOSSUM.—*Didelphys Virginiana*.

Its food consists of insects, birds, eggs, etc., and it is very destructive among the hen-roosts. The opossum uses its tail for climbing and swinging from branch to branch, as the spider monkeys use theirs; but the opossum uses its tail in a



MERIAN'S OPOSSUM.—*Philander dorsigerus*.

(Size of Life.)

manner that the monkeys have never yet been observed to do, that is, making it a support for its young, who sit on its back and twist their tails round their mother's in order to prevent them from falling off. The length of the opossum is about twenty-two inches, and its height about that of an ordinary cat. When disturbed or alarmed, it gives out a very unpleasant odor.

We now arrive at the RODENTIA, or gnawing animals, so called from their habit of gnawing through, or parting away, the substances on

which they feed. For this purpose their teeth are admirably formed, and by these teeth it is always easy to ascertain a member of the rodents. They have none of those sharp teeth called canine, such as are seen in the lions and in those animals which seize and destroy living animals, but in the front of each jaw there are two long, flat teeth, slightly curved, and having a kind of chisel edge for rasping away wood, or other articles. The constant labor which these teeth undergo would rapidly wear them away. To counteract this loss, the teeth are constantly growing and being pushed forward, so that as fast as the upper part is worn away, the tooth is replenished from below. So constant is this increase, that when an unfortunate rabbit, or other rodent, has lost one of its incisors, the opposite one, meeting nothing to stop its progress, continually grows, until sometimes the tooth curls upward over the lip, and prevents the wretched animal from eating, until it is gradually starved to death.

The BROWN RAT, sometimes called the Norway Rat, is the species usually found in England and America. It was some years since imported into this

country, and from its superior size, strength, and ferocity, has completely established itself, and expelled the original Black Rat.

It is at all times difficult to get rid of these dirty, noisy animals, for they soon learn to keep out of the way of traps, and if they are poisoned they revenge their fate by dying behind a wainscot or under a plank of the floor, and make the room uninhabitable. There are, however, two ways recommended to attain the desired object.

Place a saucer containing meal in a room frequented by rats, letting them have free access to it for several days. They will then come to it in great force. When they have thus been accustomed to feed there regularly, mix a quantity of jalap with the meal, and put it in the accustomed place. This will give them such internal tortures that they will not come near the place again. The second plan is to use the same precautions, but to mix phosphorus with the meal and make it into a ball. The phosphorus is said not to kill the rats immediately, but to afflict them with such a parching thirst that they rush to the nearest water and die there. By this method the danger of their dying in the house is avoided. I have not proved either of these plans experimentally, but offer them for the benefit of those who are afflicted by the rat pest.

The COMMON MOUSE is so well known that a description of its form and size is useless. It almost rivals the rat in its attacks upon our provisions, and is quite as difficult to extirpate. It brings up its young in a kind of nest, and when a board of long standing is taken up in a room, it is not uncommon to find under it a mouse's nest, composed of rags, string, paper, shavings, and everything that the ingenious little architect can scrape together. It is a round mass looking something like a rag ball very loosely made. When opened, seven or eight little mice will probably be found in the interior—little pink, transparent creatures, three of which could go into a lady's thimble, sprawling about in the most unmeaning manner, apparently greatly distressed at the sudden cold caused by the opening of their nest. It is worth while to notice that although to external appearance the fur of the mouse exactly resembles that of the bat, yet when they are placed under the microscope they are shown to be very differently formed. A white variety of mouse is tolerably common, and is usually bred in cages. As it is very tame and beautiful, it is in great repute as a pet.

The HARVEST MOUSE, the smallest of the quadrupeds, discovered by White and described in his "Selborne," is very much smaller than the ordinary mouse, a half-penny weighing down two of them when placed in a pair of scales. Its nest is raised about a foot and a half from the ground, and supported on two or three straws. It is made of grass, about the size of a cricket-ball, and very compact.

The WATER RAT is a native of England and America, and frequents the banks of rivers, brooks, etc. These animals exist in great numbers round Oxford, and I have repeatedly watched them feeding. I never saw them eating fish, nor found

fish-bones inside their holes, except when a kingfisher had taken possession; but I have frequently seen them gnawing the green bark from reeds, which they completely strip, leaving the mark of each tooth as they proceed.



HARVEST MOUSE.—*Micromys minutus*.

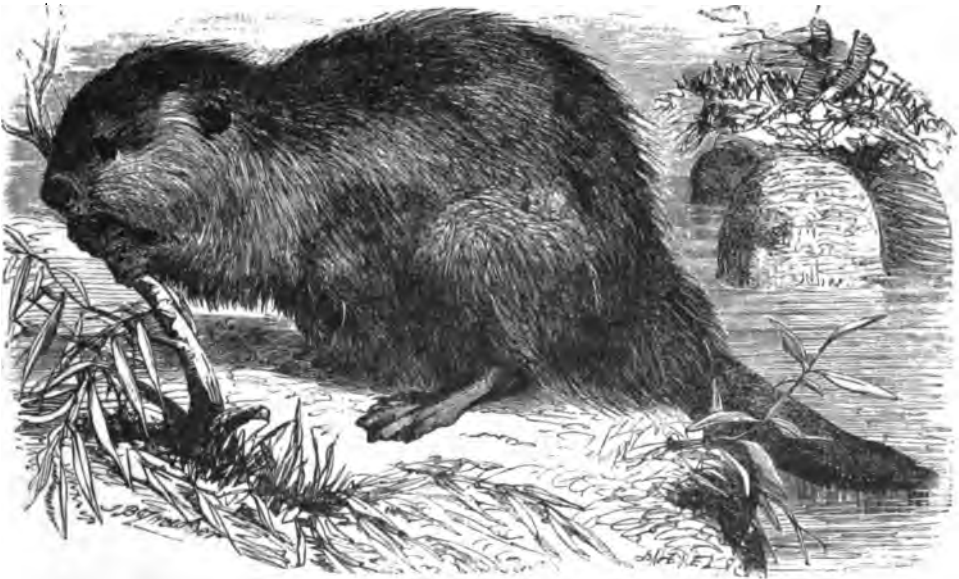
The BEAVER.—North America is the principal country where the beaver is found, but it is also common on the Euphrates, and along some of the larger European rivers, as the Rhone and the Danube. The houses of the beaver are built of mud, stones, and sticks. They are placed in a stream, and their entrance is always below the surface. As a severe frost would freeze up their doors, it is necessary to make the stream deep enough to prevent the frost from reaching the entrances. This object is attained by building a dam across the river, to keep back the water until it is sufficiently deep for the beaver's purposes. The dam is made of branches, which the beaver cuts down with its strong, sharp teeth, and mud and stones worked in among the branches. The beavers throw these branches into the water, and sink them to the bottom by means of stones, and by continually throwing in fresh supplies a strong embankment is soon made.

As many beavers live together in one society, the formation of a dam does not take very long. By their united efforts they rapidly fell even large trees, by gnawing them round the trunk, and always take care to make them fall toward the water, so that they can transport the logs easily. The mud and stones used in their embankments are not carried on their tails, as some say,

nor do the beavers use their tails as trowels for laying on the mud, the fact being that the stones and mud are carried between their chin and fore paws, and the mistake respecting the tail is evidently caused by the slap that beavers give with that member when they dive. In order that their pond may not be too deep, they always leave an opening in the dam to let the water escape when it rises above a certain height. During the severe winter their mud-built houses freeze quite hard, and prevent the wolverine, their greatest enemy, except man, from breaking

through and devouring the inmates. Every year the beavers lay a fresh coating of mud upon their houses, so that after the lapse of a few years the walls of the house are several feet in thickness. Many of the houses are built close together, but no two families can communicate with each other, except by diving below the walls and rising inside their neighbors' houses.

When in captivity the beaver soon becomes tame, and will industriously build dams across the corner of the room with brushes, boots, fire-irons, books, or anything it can find. When its edifice is finished, it sits in the centre, apparently satisfied that it has made a beautiful structure to dam up the river—a proof that the ingenuity of the beaver is not caused by reason, but by instinct. The fur of the beaver, like that of many other animals, consists of a fine wool intermixed with long and stiff hairs. The hairs are useless, but the peculiar construction of the fur causes it to penetrate and fix itself into the felt which forms the body of a hat. In making the hat, the only method required to fasten the fur into the felt is to knead



BEAVER.—*Castor Fiber.*

the fur and felt together. The hair is toothed on its surfaces, and makes its way into the felt, just as an awn of barley will travel all over the body if placed up the sleeve. The length of the beaver is about three feet and a half.

The COMMON PORCUPINE is found in America, Africa, Tartary, Persia, India,

and some parts of Europe. It lives in holes which it digs in the ground, and only comes forth at night in order to feed. It eats vegetable substances only, such as roots, bark, etc. The array of spines or quills with which this animal is covered



PORCUPINE ANT-EATER.—*Echidna Hystrix*.

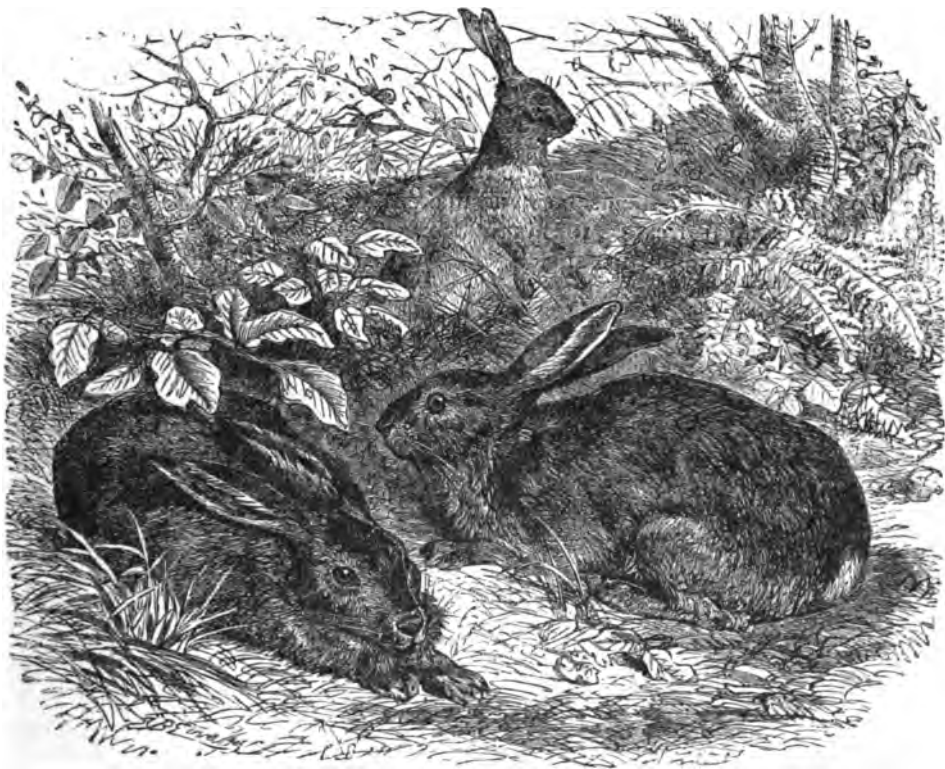
forms its principal means of defence. If it cannot escape, it suddenly stops, erects all its quills, and runs backward against its adversary, striking the quills against him by the weight of its body. Occasionally a looser quill than usual remains in the wound or falls to the ground, which evidently gave rise to the foolish error that the porcupine could dart its weapons at its adversary from a distance. There are two kinds of these quills—one kind long and curved, the other short, thick, and pointed. These last are the weapons of defence, as the former are too slender to do much service. When the porcupine walks, its quills make a kind of rustling sound, caused principally by those arranged on the tail, which are large, hollow, and are supported on long, slender stalks.

The American Indians use the quills extracted from the Canada Porcupines, a species living on trees, for ornamenting various parts of their dress, especially their moccasins or skin shoes. The length of the porcupine is about two feet, and its spines or quills are from six to fourteen inches long.

The CAPYBARA or CHIGUIRA is the largest of all the Rodentia. At first sight, it looks very like a pig, and its skin is covered thinly with hairs like bristles, which adds to the resemblance. It inhabits the borders of lakes and rivers in many parts of Southern America. During the day, it hides among the thick herbage of the banks, only wandering forth to feed at night, but when alarmed it instantly makes for the water, and escapes by diving. It is hunted for the sake of its flesh, which is

said to be remarkably good. The food of the capybara consists of grass, vegetables, and fruits. Its length is about three feet six inches.

The GUINEA-PIG or RESTLESS CAVY belongs to the sub-family Caviina. It was originally brought from South America and is frequently domesticated in England. Its beauty is its only recommendation, as it shows little intelligence and is never used for food. Children, however, and particularly school-boys, are fond of keeping guinea-pigs, as they are wonderfully prolific, easy to manage, and do not make much noise. They are popularly supposed to keep off rats, and are therefore usually patronized in connection with rabbit-hutches.



HARE.—*Lepus timidus*.

The HARE is one of our most common quadrupeds. When full-grown, it is larger than the rabbit and exceedingly like that animal, but its color is slightly different, and the black spot on the extremity of its ears is a simple method of distin-

guishing it. The hare does not burrow like the rabbit, but makes a kind of nest of grass and other materials. In its nest, called a "form," the hare lies, crouching to the ground, its ears laid along its back, and, trusting to its concealment, will often remain quiet until the foot of an intruder almost touches it.

Innumerable foes besides man surround this animal. Foxes, ferrets, stoats, and all their tribe, are unmerciful enemies, and sometimes a large hawk will destroy a leveret, as the young hare is called. Although destitute of all means of defence, it is often enabled to escape by the quickness of its hearing and sight, which give it timely warning of the approach of an enemy, and enable it to escape to a place of safety. In cold countries the hare changes its fur during winter, and becomes white, like the Arctic fox and ermine. The Alpine hare, inhabiting the northern parts of Scotland, is a good example of this change.

The well-known RABBIT is rather smaller than the hare, but closely resembles it in form. It lives in deep holes, which it digs in the ground. The female rabbit forms a soft nest at the bottom of her burrow, composed of fur torn from her body, hay, and dried leaves. Here the young rabbits are kept until they are strong enough to shift for themselves and make their own burrows.

One of their most dreaded foes is the fox, which is ever on the alert to seize them as they gambol around in fancied security. His cunning methods are graphically described as below by Elliot and illustrated in our frontispiece: "Even now one of these keen-scented animals is apprised of the presence of a little colony. How carefully he moves! Crouched low toward the ground, the feet are lifted slowly in succession, and then are placed softly upon the grass, as if he were feeling his way. Soon he sees before him, portrayed upon the side of a rock that glitters in the bright light of early morning, the dancing shadows of two of the graceful creatures that are playing together just beyond him. All kinds of movements are depicted upon that novel mirror by the lively animals, and the face of the stone seems itself in motion as the shadowy forms pass rapidly about its surface. Soon he will see their nimble figures as they draw closer to his vicinity, then the spring will suddenly be made, and the shrill scream of the startled victim will tell the story of the fox's success."

The tame rabbit is only a variety, rendered larger by careful feeding and attendance.

The JERBOAS are celebrated for their powers of leaping. Their long hind legs enable them to take enormous springs, during which their tails serve to balance them. Indeed a jerboa when deprived of its tail is afraid to leap.

In the history of the polar bear it was mentioned that its feet were prevented from slipping on the ice by a coating of thick hair. The foot of the jerboa is defended in the same manner by long bristly hairs, which not only give the creature a firm hold of the ground for its spring, but also defend the foot from the burning soil on which it lives. The timidity of the jerboa is very great, and on the



THE HARE AND ITS ENEMIES.

slightest alarm it instantly rushes to its burrow, but if intercepted, skims away over the plain with such rapidity that it seems to fly, and when at full speed a swift greyhound can scarcely overtake it.

Grain and bulbous fruits are its chief food; while eating, it holds the food with its fore paws, and sits upright on its haunches, like the squirrels and marmots.

There are many kinds of jerboa; the Egyptian Jerboa is rather small, being about the size of a large rat; its color is a tawny yellow.

The DORMOUSE is very common in all the warmer parts of this continent, and is often found in England, especially in the southern and midland counties. It lives in copses and among brushwood, through which it makes its way with such rapidity that it is very difficult to be captured. During the winter it lies torpid, but takes care to have a stock of food laid up, on which it feeds during the few interruptions to its slumbers. A warm day in winter will rouse it, but during the cold weather it lies rolled up, with its tail curled round its body. While in this torpid state, a sudden exposure to heat kills it, but a gentle warmth, such as holding it in the hand, rouses it without injury. It lives principally on nuts, acorns, and grain. It brings up its young in a nest composed of leaves and hay, and seems to be fond of society in its household labors, as ten or twelve nests have been seen close to each other.

The SQUIRREL is a very common animal in woods, where numbers may be seen frisking about on the branches, or running up and down the trunks. If alarmed, it springs up the tree with extraordinary activity, and hides behind a branch. By this trick it escapes its enemy, the hawk, and by constantly slipping behind the large branches, frequently tires him out. The activity and daring of this little animal are extraordinary. When pursued, it makes the most astonishing leaps from branch to branch, or from tree to tree, and has apparently some method of altering its direction while in the air, possibly by means of its tail acting as a rudder.



DORMOUSE.—*Muscardinus avellanarius*.

It is easily domesticated, and is very amusing in its habits when suffered to go at large in a room or kept in a spacious cage; but when confined in a little cramped box, especially in one of the cruel wheel cages, its energies and playfulness are quite lost. Men often go about with squirrels for sale, and generally cheat



SQUIRREL.—*Sciurus Europæus*.

those who buy them. In the first place they constantly try to sell old squirrels for young, but this imposition may be detected by looking at the teeth of the animal, which are nearly white if young, but if old are of a light yellow. In the second place, let the purchaser beware of very tame and quiet squirrels. These are generally animals just caught and perfectly wild, but are made sedate by a dose of opium or strychnine, which in many cases causes their death in a short time. One of my friends was deceived in this manner only a few months since, the squirrel dying in the

course of the evening of the day on which it was purchased. The color of the squirrel is usually a deep reddish brown, and its tail so large and bushy as to shade its whole body when carried curled over its back, from whence it derives its name of *Sciurus*, or shadow-tail.

WOODCHUCK.—A small animal found almost all over the United States and Canada. It is somewhat larger than a rabbit and is usually blackish gray on the back and reddish brown below. It digs deep holes in the ground, with several parts and entrances, and so built that the water cannot run into them. Its food is chiefly plants, vegetables, and fruit, and it is often a great pest to the farmer. Woodchucks are very cleanly in their habits, and make pretty pets when tamed. In the Southern States they are sometimes called ground-hogs.

The **RUMINANTIA**, or animals that chew the cud, include the oxen, sheep, and goats, deer, giraffe, and camels. They have a peculiar construction of stomach, which receives the freshly gathered food, retains it for some hours, and then passes it back into the mouth to be re-masticated. The Ox is spread widely over the earth, scarcely any country being without its peculiar breed. In this country, where it is our most useful domesticated animal, there are many breeds throughout the States, generally distinguished by the length or shape of their horns.

There is the "long-horned breed" from Lancashire, England, the "short-horned" from Durham, the middle-horned" from Devonshire, and the "polled" or hornless breed. Each of these breeds has its particular value; some fatten easily, and are kept especially for the butcher. Others give milk, and are valuable for the dairy. The best dairy cow is the Alderney, a small, short-horned animal, furnishing exceedingly rich milk.

In some parts of America oxen are used to draw wagons, or to drag the plough. They are not so strong as horses, and their movements are much slower.

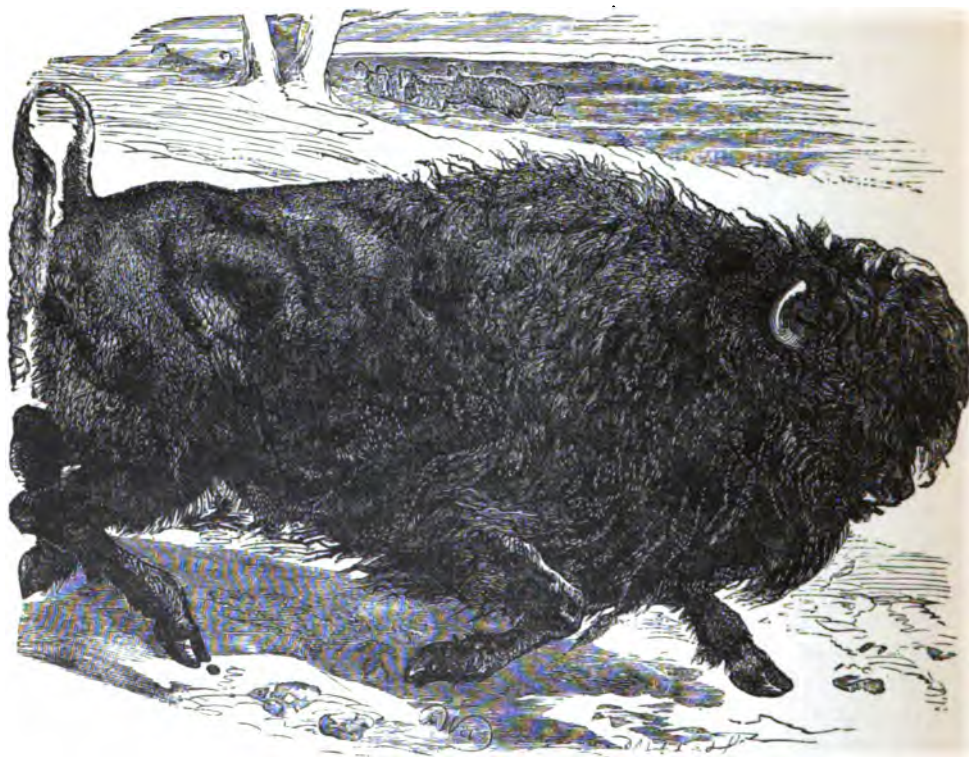
Every part of the ox is of value. We eat his flesh, we wear shoes soled with his skin, our candles are made from his fat, our tables are joined with glue made from his hoofs, his hair is mixed with the mortar of our walls, his horns are made into combs, knife-handles, drinking-cups, etc., his bones are used as a cheap substitute for ivory, and the fragments ground and scattered over the field as manure, and soup is made from his tail. The young ox is called a calf, and is quite as useful in its way as the full-grown ox. The flesh is termed veal, and by many preferred to the flesh of the ox or the cow, which is called beef; jelly is made from its feet. The stomach is salted and dried, and is named rennet. Cheese is made by soaking a piece of rennet in water, and pouring it into a vessel of milk. The milk soon forms a curd, which is placed in a press, and the watery substance, called whey, squeezed from it. The curd is colored and salted, and is then cheese.

The CAPE BUFFALO is a native of Southern Africa. It is exceedingly ferocious and cunning, often lurking among the trees until an unsuspecting traveller approaches, and then rushing on him and destroying him. The ferocious creature is not content with killing his victim, but stands over him mangling him with its horns, and stamping on him with its feet.

The BISON or BUFFALO inhabits the plains or prairies of North America in countless multitudes. Its enormous and heavy mane, its fierce eyes and lowering appearance, give this animal a most terrific aspect. The American Indians constantly hunt the bison, which they call by the name of buffalo. Their weapons are principally bows and arrows, apparently weak and small, but which, when wielded by a skilful hand, will strike the huge bison to the heart. In Catlin's account of his travels among the North American Indians are many most interesting accounts of "buffalo hunts." Mounted on a swift horse, and armed with a spear and bow and arrows, the Indians kill great numbers of these animals. They ride close up to the bison, and with the greatest apparent ease bury an arrow up to its feather in the creature's body. Indeed, many instances are known where the slight Indian bow, drawn without any perceptible effort, has thrown the arrow completely through the body of the huge animal. There are many modes of destroying this animal in vogue among the Indians and white settlers. The skin is so valuable that every exertion is made to procure it. Of the buffalo's hide they make their wigwams or tents, their shields, their robes, their shoes, etc. The Indians can also sell the hides

to the traders for a considerable sum, so that an Indian can almost measure his importance and wealth by the number of hides that he takes.

The hunters take advantage of the gregarious instincts of this animal, and hunt them when they are collected together in their vast herds, which blacken the



BISON.—*Bison Americanus*.

face of the prairie for miles. Sometimes they form in line, and drive the herd to the edge of some tall cliff, over which they fall in hundreds, those behind pushing on those in the van ; or sometimes they form a large circle, driving the animals into a helpless and leaderless mass, into which the hunters spring, leaving their horses, and treading with the skill of rope-dancers on the backs of the bewildered bisons, whom they slaughter as they pass, stepping from one to the other, and driving the sharp blade of their spear through the spine of the animal whose back they have just quitted.

When only wounded the bison is a most dangerous antagonist, and rushes on its enemy with the most determined ferocity. Despite the wholesale slaughter of this animal which is carried on annually by the Indians, there seems to be no decrease in their numbers. They are more wary than before, and have withdrawn themselves into more distant lands, but their dark masses still crown the plain as of yore, although it is now impossible to judge as men could do in former days of the various migrations which the herds would make. The dreaded fire-arms have had their effect on the bison as on every other animal, and it withdraws as far as possible from the haunts of civilized man. The improvidence of the Indians is much to be regretted. Myriads of these animals are slaughtered every year, merely for the sake of their skin, their "hump," or their marrow-bones, the remainder of the animal being left to the wolves and the birds.

The principal use of the flesh of the bison is to make "jerked meat" of it. This is made by cutting the meat into long narrow slips, and drying them in the sun. There is a peculiar art in the cutting of these slips. The operator takes a large lump of the flesh, and holding his knife firmly in one hand, presses the meat against its edge with the other, continually turning it round and round, until the whole piece is converted into one long strip. The strips thus prepared are pegged out on stakes, as washerwomen peg their clothes, or suspended in festoons on the branches of trees, like red snakes, until they are dry enough to be packed up. Three days is considered sufficient for the purpose. The cow is preferred to the bull for conversion into jerked meat, while the skin of the bull is more valuable than that of the cow, from the mass of woolly hair about the shoulders.

The flesh of the bison is tolerable eating, but the "hump" appears from all accounts to be unapproachable in delicacy. It is exceedingly tender, and possesses the property of not cloying even when eaten in excess. The fat also is said to be devoid of that sickening richness which is usually met with in our domesticated animals. The cow is smaller than the bull, and considerably swifter. She is also generally in better condition and fatter than her mate, and in consequence the hunters who go to "get meat" always select the cows from the herd.

The YAK inhabits Tartary. Of this animal in a native state little or nothing is known. The name of "grunniens," or grunting, is derived from the peculiar sound that it utters. The tail of the yak is very long and fine, and is used in India as a fan or whisk to keep off the mosquitoes. The tail is fixed into an ivory or metal handle, and is then called a chowrie. Elephants are sometimes taught to carry a chowrie, and wave it about in the air above the heads of those who ride on its back. In Turkey, the tail is called a "horse-tail," and is used as an emblem of dignity. From the shoulders of the yak a mass of long hair falls almost to the ground, something like the mane of a lion. This hair is applied to various purposes by the Tartars. They weave it into cloth, of which they not only make articles of dress, but also tents, and even the ropes which sustain the tents.

KODOO.—*Strepsiceros Kudu*.

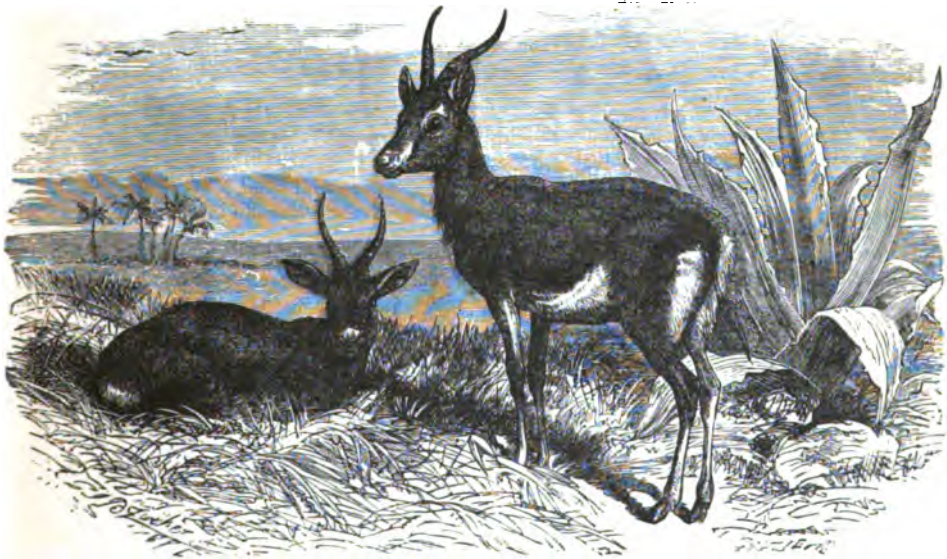
The GN00, or WILDEBEEST, inhabits Southern Africa. At first sight it is difficult to say whether the horse, buffalo, or deer predominates in its form. It however belongs to neither of these animals, but is one of the bovine antelopes. The horns cover the top of the forehead, and then, sweeping downward over the face, turn boldly upward with a sharp curve. The neck is furnished with a mane like that of the horse, and the legs are formed like those of the stag. It is a very swift animal, and when provoked, very dangerous. When it attacks an opponent it drops on its knees, and then springs forward with such force, that, unless he is extremely wary and active, he cannot avoid its shock.

When it is taken young, the gn00 can be domesticated, and brought up with other cattle, but it will not bear confinement, and is liable to become savage under restraint. There are several species of this animal, three being satisfactorily ascertained, namely, the common Gn00, represented in Joseph Wolf's engravings,

the Cocoon (*Catoblepas Taurina*), and the Brindled Gnool (*Catoblepas Gorgon*). The size of the gnool is about that of a well-grown ass, that is, about four feet in height. Its flesh is in great repute both among the natives and colonists.

The Koodoo is a native of South Africa, living along the wooded borders of rivers. It is chiefly remarkable for its beautiful shaped horns, which are about four feet in length and twisted into a large spiral of about two turns and a half. A bold ridge runs along the horns and follows their curvature. When hard pressed it always takes to the water, and endeavors to escape by its powers of swimming. Although a large animal, nearly four feet in height, it can leap with wonderful activity. The weight of the horns is very considerable, and partly to relieve itself of that weight, and partly to guard them from entanglement in the bushes among which it lives, and on which it feeds, it carries its head backward, so that the horns rest on its shoulders.

The GAZELLE, so famous in Oriental poetry, inhabits Arabia and Syria. Its eyes are very large, dark, and lustrous, so that the Oriental poets love to compare



GAZELLE.—*Gazella Dorcas*.

the eyes of a woman to those of a gazelle, just as Homer constantly applied the epithet ox-eyed (*βοώπις*) to the more majestic goddesses, such as Juno and Minerva. It is easily tamed when young, and is frequently seen domesticated in the court-yards of houses in Syria. Its swiftness is so great that even a greyhound cannot

overtake it, and the hunters are forced to make use of hawks, which are trained to strike at the head of the gazelle, and thus confuse it, and retard its speed, so as to permit the dogs to come up. The height of the gazelle is about one foot nine inches; its color a dark yellowish brown fading into white on the under parts.

The CHAMOIS is found only in mountainous regions, especially the Alpine chains of Europe and Western Asia. It lives on the loftiest ridges, displaying wonderful activity, and leaping with certainty and security on places where the eye can hardly discern room for its feet. The skin of the chamois is used extensively by shoemakers. Several genera are omitted.

The ANTELOPE.—The Pronghorn, one of the antelopes of North America, is about as large as the common deer, and has coarse hair, yellowish-brown above, and white on the rump and under part. The hoofs, horns, and end of the nose are black. The horns, which grow nearly straight up and bend toward each other at the top, have each a single branch or prong about half way up, and from this the animal gets its name. The pronghorn is often seen by travellers on the Pacific Railway. One will sometimes run beside a train for a mile or two, as if trying to run a race with it. Its speed is so great that it is almost useless to chase it; but it is not a hard animal to kill, because it has so much curiosity that if the hunter waves a handkerchief it will come near enough to be shot. The Indians lie flat on their backs and kick up their heels, with a rag or some other thing fastened to them, and the pronghorns, coming up to see what the strange thing is, get near enough to be killed with the bow and arrow.

The Rocky Mountain Goat, the other American antelope, lives in the wildest and most rugged parts of the Rocky Mountains, seldom coming down into the plains. It is about as large as a sheep, and it has a beard like a goat, but its horns are like those of the chamois. Its body is covered next to the skin with a fine silk-like wool, and over this are long shaggy hairs.

The IBEX inhabits the Alpine regions of Europe and Western Asia. It is instantly recognized by its magnificent horns, which curve with a bold sweep from the head almost to the haunches. The horns are surrounded at regular intervals with rings, and are immensely strong, serving, as some say, to break the fall of the ibex when it makes a leap from a height. The height of the ibex is two feet six inches; the length of its horns often three feet.

The common GOAT is not in much request in England and America, but in some other countries, as Syria and Switzerland, large herds of goats are kept for the sake of their milk, and in fact almost entirely take the place of the cow. The most celebrated variety of this animal is the Cashmere goat, which furnishes the beautifully fine wool from which the costly Cashmere shawls are made. The shawls bear a high value even in their own country, but in Europe the price is much increased by the various taxes which are paid in every stage of the manufacture—the average number of taxes paid on each shawl being about thirty, several of which are limited only by the pleasure of the collector.

IBEX — *Capra ibex*.

The SHEEP.—There are many kinds of sheep, among which the common sheep, the long-tailed sheep, and the Wallachian sheep are the most conspicuous. Next to the cow, the sheep is our most useful animal. California produces better wool than any country; for although the wool of the Spanish sheep is finer than ours, it is much less in quantity. The Merino, as this sheep is called, is annually conducted from one part of the country to another, and back again. The distance traversed is upward of four hundred miles, and the time necessary to complete the journey about six or seven weeks. The proprietors of the flocks think that these periodical journeys improve the wool; but it is in all probability a mistaken notion, as the stationary flocks of Leon and Estremadura produce quite as fine a fleece. Of course such a body of sheep—nearly ten thousand—do great damage to the lands over which they pass, and many fall victims to fatigue or are destroyed by wolves.

The Long-tailed Sheep inhabits Syria and Egypt. Its tail is so large and so

loaded with fat, that, to prevent it from being injured by dragging on the ground, a board is fastened to the under side of it, and wheels are often attached to the board. The peculiar fat of the tail is considered a great delicacy, and is so soft as

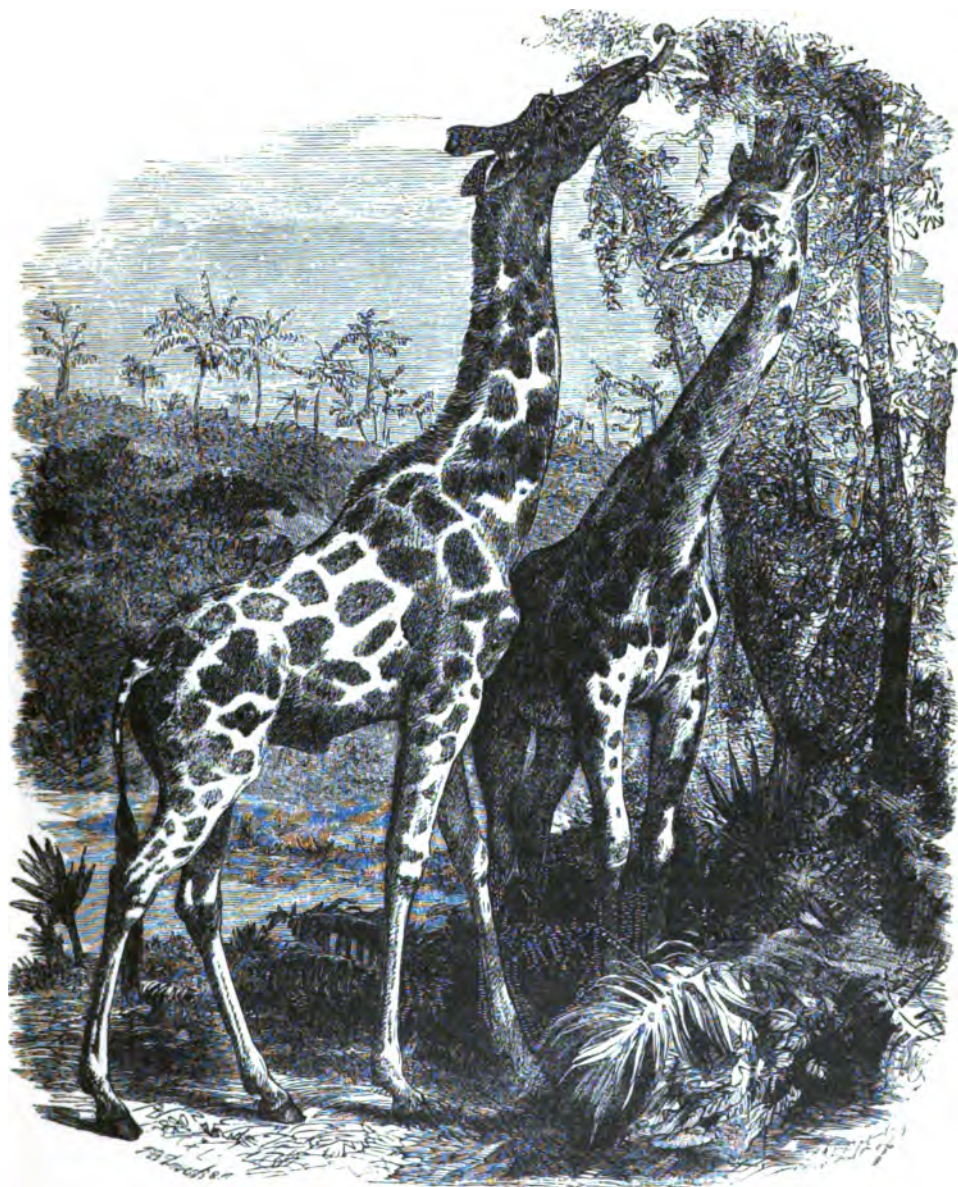


WALLACHIAN, OR CRETAN SHEEP.

to be frequently used as butter. The weight of a large tail is about seventy pounds.

The Wallachian or Cretan Sheep is found in Crete, Wallachia, Hungary, and Western Asia. Its horns are exceedingly large, and are twisted in a manner resembling the koodoo. It is very strong, and extremely vicious and unruly. In this and several other sheep the fleece is composed of wool and hair mixed. The hair of the Wallachian sheep is long and silky like that of a spaniel, and of great length, falling almost to the ground.

The GIRAFFE.—This beautiful and extraordinary animal is found only in South Africa. As the gnou seems to combine the properties of the antelope, horse, and



GIRAFFE.—*Giraffa Camelopardalis*.

buffalo, so the giraffe appears to bear the characteristics of the antelope and the camel. In the opinion of modern naturalists, it holds a place by itself between the deer and antelopes. It forms, at all events, a group to which no other animals belong.

The height of the giraffe varies from thirteen to eighteen feet. Its beautiful long neck enables it to browse on the leaves of the trees on which it feeds. It is very dainty while feeding, and plucks the leaves one by one with its long and flexible tongue. On its head are two very remarkable projections, closely resembling horns. These projections are not horns, but only thickenings of the bone of the skull, covered with skin, and bearing a tuft of black hair at the extremity of each. The fore legs at first sight appear longer than the hind ones, but this apparent difference is only caused by the great length of the shoulder-blades, as both pair of legs are of the same length at their junction with the body. Its eyes are very large and prominent, so that the animal can see on every side without turning its head. Just over and between the eyes is a third bony prominence, resembling the projecting enlargements of the skull, called horns. The use of these projections is not very well known, as although in play the giraffe will swing its head round and strike with it, yet when it wishes to repel an assailant it has recourse to violent and rapid kicks from its hind legs. So light and swift are these kicks that the eye can scarcely follow them, and so powerful are they that the lion is not unfrequently driven off by them. Le Vaillant relates that a giraffe which he was hunting kept off his pack of dogs by its rapid kicks. Indeed, if it were to venture its head too near the lion, a blow from his tremendous paw would in all probability lay the animal prostrate.

The skin of this animal is an inch and a half in thickness, so that it is necessary for the hunter to make very sure of his aim before he fires at an animal so well defended. The giraffe has much difficulty in reaching the ground with its mouth, nor does it often attempt to do so, unless it is bribed with something of which it is very fond, such as a lump of sugar. It then straddles widely with its fore legs, and with some trouble succeeds in reaching the object aimed at. This attitude was noticed and copied in the Prænestine pavement. The first living giraffes, in the possession of the Zoological Society, were brought by M. Thibaut. He succeeded in taking four, all of which he brought with him. One of them is still living. From this stock several giraffes have been born, some of which are now in England, and others have been sent to other countries.

One of the four originals killed himself soon after his arrival, by striking his head against a wall as he was rising from the ground. An accident of the same nature happened recently to another animal, one of its horns being broken off, and bent backward; but owing to the presence of mind of the keeper, who immediately pulled the horn into its place again, no bad results followed, the fractured parts uniting naturally.

The tongue of the giraffe is one of the most remarkable parts of its structure. It is very flexible and capable of great changes of form, the giraffe being able to contract it so that its tip could enter an ordinary quill. The animal is very fond of exercising its tongue, and sometimes pulls the hairs from its companions' manes and tails, and swallows them—no very easy feat, as the hair of the tail is often more than four feet long.

The movements of the giraffe are very peculiar, the limbs of each side appearing to act together. It is very swift, and can outrun a horse, especially if it can get among broken ground and rocks, over which it leaps with a succession of frog-like hops. In this country it endures the climate well. The giraffes in the Zoological Gardens which were born and bred in this country seem very healthy and are exceedingly tame, examining the hands of their visitors, and following them round the enclosure. They eat herbs, such as grass, hay, carrots, and onions. When cut grass is given to them, they eat off the upper parts and leave the coarse stems, just as we eat asparagus.

The CAMEL.—There is much confusion about the names of the camels. The Bactrian Camel is distinguished by bearing two humps on its back, the Arabian Camel by bearing only one. The Arabian camel is sometimes, but erroneously, called the Dromedary, as the Dromedary, or El-Heirie, is a lighter variety of that animal, and only used when dispatch is required. The camel forms the principal wealth of the Arab; without it he could never attempt to penetrate the vast deserts where it lives, as its remarkable power of drinking at one draught sufficient water to serve it for several days, enables it to march from station to station without requiring to drink by the way. The peculiar structure of its stomach gives it this most useful power. In its stomach are a great number of deep cells, into which the water passes, and is then prevented from escaping by a muscle which closes the mouth of the cells. When the camel feels thirsty, it has the power of casting some of the water contained in these cells into its mouth. The habits of this animal are very interesting.

The foot of the camel is admirably adapted for walking on the loose sand, being composed of large elastic pads, which spread as the foot is placed on the ground. To guard it from injury when it kneels down to be loaded, the parts of the body on which its weight rests are defended by thick callosities. The largest of these callosities is on the chest, and others are placed on the joints of the legs.

The Bactrian camel inhabits Central Asia, Thibet, and China. It is distinguished from the Arabian camel by possessing two humps.

The LLAMAS, of which there are several species, inhabit America, and are used for the same purpose as the camel. When wild they are very timid, and fly from a pursuer the moment that they see him; but their curiosity is so great that the hunter often secures them by lying on the ground and throwing his legs and arms about. The llamas come to see what the extraordinary animal can be, and give the

hunter an opportunity of firing several shots, which the astonished animals consider as a part of the performance.

The llamas, like the camels, have a series of cells in the stomach for containing water, and can go for several days without requiring to drink. If too heavily



ALPACA LLAMA.—*Llama Pacos.*

laden, or when they are weary, they lie down, and no threats or punishment will induce them to rise, so that their masters are forced to unload them. When offended they have a very unpleasant habit of spitting at the object of their anger. Formerly it was supposed that their saliva was injurious, and produced blisters if it touched the skin. The fleece of the llama is very long and fine, more resembling silk than wool. It is very valuable, and is extensively imported into this country for the purpose of making cloth and other fabrics. The fleece of the Alpaca is considered the best, as it is sometimes twelve inches in length, and very fine. In Chili and Peru the natives domesticate the llama, which in the state of captivity frequently becomes white. It is by no means a large animal, as it measures about four feet six in height. In general shape it resembles the camel, but has no hump on its back, and its feet are provided with sharp hoofs for climbing the rocky hills among which it lives. In Peru, where it is most commonly found, there are public shambles established for the sale of its flesh.

The RED-DEER, or STAG, is the largest of our deer. In the language of hunt-



RED DEER.

ers, it bears different names, according to the size of its horns, which increase year by year. All the male deer have horns, which they shed every year, and renew again. The process of renewal is most interesting. A skin, filled with arteries, covers the projections on which the horns rest. This skin, called the "velvet," is engaged in continually depositing bone on the footstalks, which rapidly increase in size. As the budding horns increase, the velvet increases also, and the course of the arteries is marked on the horn by long furrows, which are never obliterated. When the horn has reached its full growth, it cannot be at once used, as the velvet is very tender, and would bleed profusely if wounded. The velvet cannot be suddenly removed, as the blood that formed the arteries would rush to the brain and destroy the animal. A ring of bone forms round the root of each horn, leaving passages through which the arteries pass. By degrees, these passages become narrow, and finally close entirely, thus gradually shutting off the blood. The velvet being deprived of its nourishment, dies, and is peeled off by the deer, by rubbing against a tree, leaving the white, hard horn beneath.

Hunting the stag is a very favorite amusement in many countries, and packs of hounds, called stag-hounds, are kept expressly for that purpose.

The FALLOW-DEER are usually seen in parks, where they congregate in large herds, and form a most pleasing addition to the landscape when they are seen reposing under the trees, or chasing one another in graceful play. One peculiarly large buck always takes the lead, and suffers none but a few favorite does to approach his regal presence, all the other bucks moving humbly away directly he makes his appearance. They are generally tame, and will suffer people to come very close to them; but at certain times of the year they become savage, and will not permit any one to approach their domains. If an intruder is bold enough to venture within the proscribed distance, the buck will instantly charge upon him, and if he does not make his escape, will in all probability inflict considerable damage upon him. They soon become familiar with those who treat them with kindness, and will eat from their hands.

The REINDEER is found throughout the Arctic regions of Europe, Asia, and America. The finest animals are those of Lapland and Spitzbergen. The Laplander finds his chief wealth in the possession of the reindeer, which not only serves him as a beast of burden, but furnishes him also with food and clothing. A Laplander in good circumstances possesses about three or four hundred deer, which enable him to live in comfort. The subsistence of one who only possesses one hundred is very precarious, and he who has only fifty usually joins his animals with the herd of some richer man, and takes the menial labors upon himself.

The reindeer feeds principally on a kind of lichen, which it scrapes from beneath the snow. During the winter, its coat thickens, and assumes a lighter hue, many deer being almost white. Its hoofs are divided very high, so that when the animal places its foot on the ground, the hoofs spread wide, and as it raises the

FALLOW-DEER.—*Dama vulgaris*.

foot, a snapping noise is heard, caused by the parts of the hoofs closing together. When harnessed to a sledge, it can draw from 250 to 300 pounds' weight at about ten miles an hour.

The EUROPEAN ELK inhabits the northern parts of Europe. It was considered at one time to be identical with the American Elk, but naturalists now believe it to be a distinct animal. Its usual pace is a high awkward trot, but when frightened, it sometimes gallops. It is very strong, and can destroy a wolf with a single blow of its large and powerful horns. In Sweden it was formerly used to draw sledges, but on account of the facility of escape offered to criminals by its great speed, the use of it was forbidden under high penalties. The skin of the elk is so tough, that a regiment of soldiers was furnished with waistcoats made of its hide which could scarcely be penetrated by a ball.

Like the reindeer, the elk makes a great clattering with its hoofs when in rapid motion. It is a good swimmer, and is fond of taking to the water in summertime. It is a rather dangerous antagonist when incensed, as it fights desperately with its horns and hoofs, with which latter weapons it has been known to destroy a wolf with a single stroke.

We now arrive at the *PACHYDERMATA*, or thick-skinned animals which do not chew the cud. The first on the list is the HORSE, an animal too well known in all its varieties to need much description. The ancient war-horse, so magnificently described in the Book of Job, is well represented by that most wonderful head, a fragment from the Temple of Minerva at Athens. The ancients never appeared to ride on the horse to battle, but fought from small open chariots, to which two or more horses were harnessed.

The Arabian Horse is a model of elegance and beauty. The Arab treats his horse as one of his family; it lives in the same tent with him, eats from his hand, and sleeps among his children, who tumble about on it without the least fear. Few Arabs can be induced to part with a favorite horse. The Rev. V. Monro relates that an Arab, "the net value of whose dress and accoutrements might be calculated at something under thirty-seven and a half cents," refused all offers made to purchase a beautiful mare on which he rode, and declared that he loved the animal better than his own life.

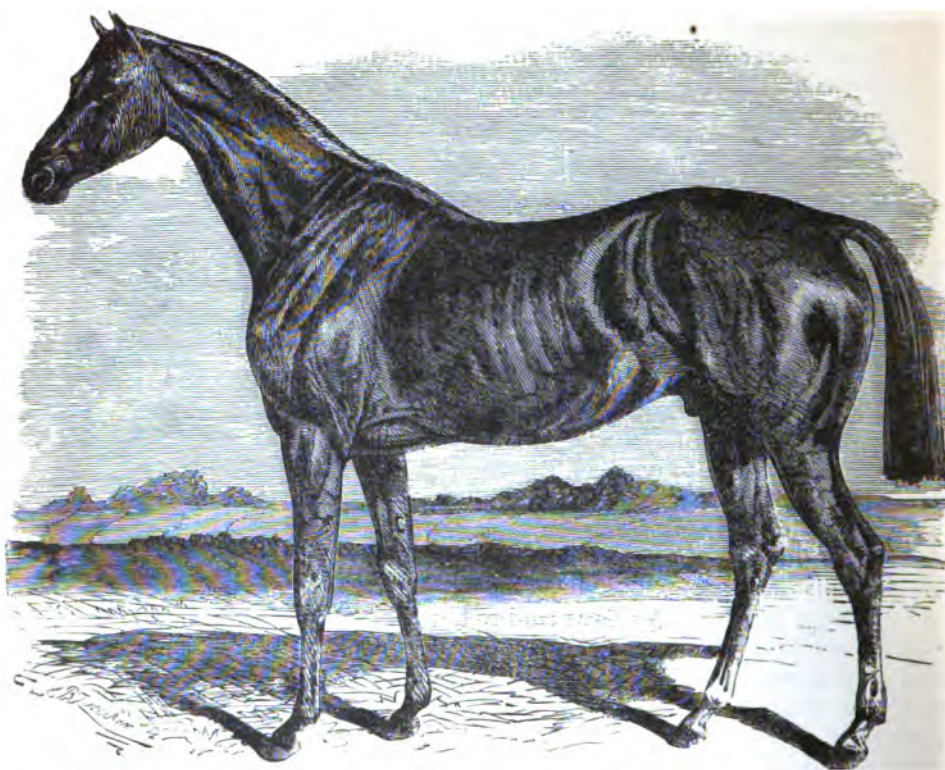
A horse in Norwich, Vt., was sold to a man in Oxford, N. H. As he was being taken from the wagon one evening he slipped away from his new owner and disappeared at a gallop. In six hours he reached his old home, having crossed the Connecticut River and travelled 27 miles in the darkness, over a road he had not seen since he was a colt.

The plains of La Plata and Paraguay are tenanted by vast herds of wild horses. These are captured by the lasso, bitted, mounted, and broken within an hour, by the daring and skilful Gauchos.

The English Horse, from which the best horses in the United States have come, has much Arabian and Barb blood in it. The racehorse is swifter for short distances than the best Arabian horse. It is much like the Arabian in looks, but is taller and longer, and has changed in color. The Arabian horse is generally white, light gray, or flea-bitten, but the racehorse is more usually bay and chestnut. The changes have probably come from the difference in the climate and in the way the horses are brought up. The American racehorse is descended from the English racehorse, and is therefore also of Arabian blood.

The Godolphin Arabian, Flying Childers, Iroquois, and Foxhall are four of the most celebrated racers.

The fastest mile ever run by a racehorse in the United States up to 1879 was made by the horse named Ten Broeck, in one minute and thirty-nine and three quarter ($1 : 39\frac{3}{4}$) seconds.



RACEHORSE.

The Trotting Horse of the United States and Canada is the fastest in the world. It is not a thoroughbred horse, or a horse of pure racing blood, like the racehorse, but is generally a descendant of a cross between the racehorse and some common breed; but a few thoroughbred racing horses have been taught to trot very fast. It is not usually as tall as the running horse, and is sometimes small. There is also a good breed of trotting horses in Russia, called Orloff trotter, which is faster than common horses, but not so fast as the American trotter. The fastest mile ever trotted in the United States up to 1881 was made at Chicago by the mare Maud S. in two minutes and ten and three quarter ($2:10\frac{3}{4}$) seconds.

Draught Horses, or horses used for drawing heavy loads, are raised in many countries. In France the Percheron breed has been noted for hundreds of years. Many of them are to be seen in Paris, where they are much used for drawing omni-

buses and business wagons, and some of them are used in the United States. They are large, heavy horses, with large heads. In England the breeds called the Suffolk, the Cleveland Bay, and the Clydesdale are noted for their size and strength. The Flanders horse, of Belgium and Holland, is very large, heavy, and strong. Many of the great horses used by brewers in London and Paris are of this breed.

All these breeds are called heavy draught horses, because they are used in the heaviest kinds of trucks and large wagons. There are also light draught horses, for drawing lighter loads, which are not quite so heavy in the body and are quicker in their motions. The carriage horse is of a lighter and more elegant form than the common draught horse, but is generally large and strong. The saddle horse should be a little smaller than the carriage horse, and should be graceful and active in all its movements. It should be taught not only to obey the rein, but to understand every motion of its rider.

Ponies are found in many countries. Among the most noted are the Shetland ponies, raised in the islands of the same name, north of Scotland, where they are called Shelties. Some of these little horses are not much larger than a great dog,



SHETLAND PONY.

but they are very strong, and will carry a man with ease. The Indians of the western parts of the United States have a breed of ponies which are very hardy and strong. One of them will travel all day long with a heavy man on its back.

The Ass.—The humble and hardy ass is scarcely less serviceable to man than the more imposing horse. In this country, where it meets with harsh treatment, is scantily fed, and only used for laborious tasks, it is dull and obstinate ; but in the East, where it is employed by rich nobles, and is properly treated, it is an elegant and spirited animal, with good action and smooth coat.

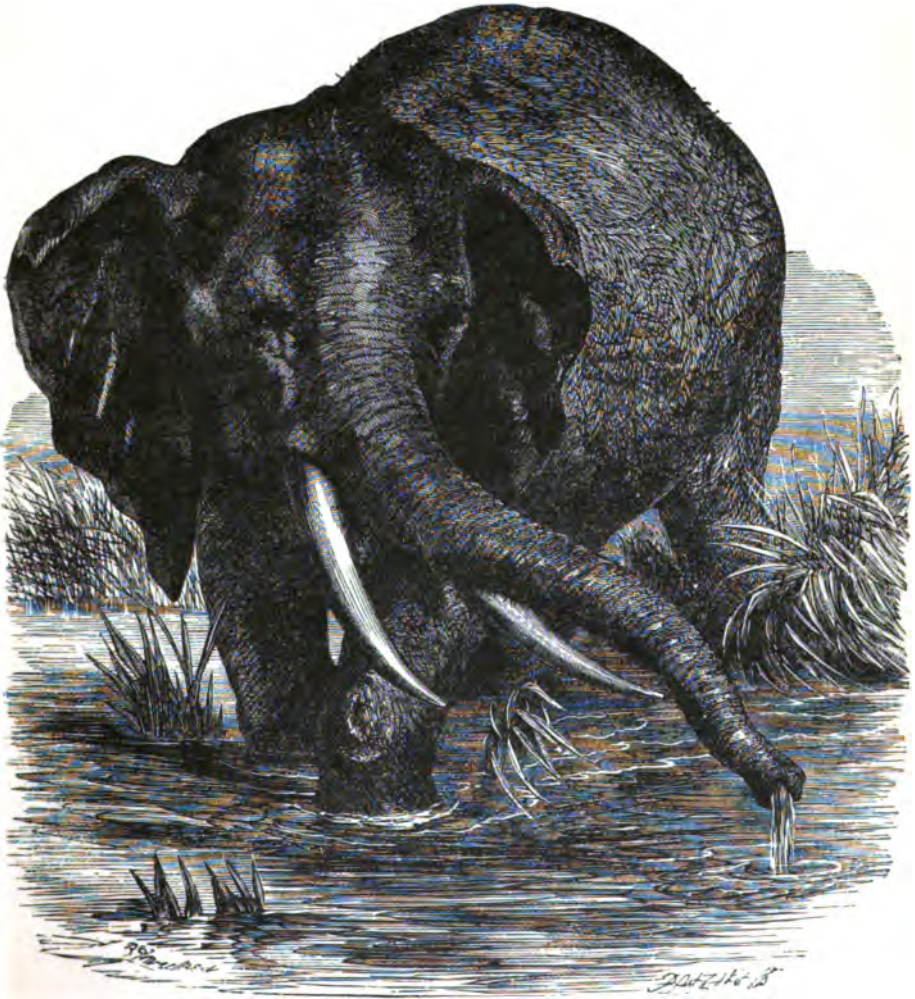
The ZEBRA is found in South Africa. This beautiful animal lives in troops among the mountains, shunning the presence of man. It is a very conspicuous animal, and easy distinguished by the regular stripes of brownish black with which its whole body is covered, even down to the hoofs. It is very wild and suspicious, carefully placing sentinels to look out for danger. Notwithstanding these precautions, several zebras have been taken alive, and some, in spite of their vicious habits, have been trained to draw a carriage. In all probability it might be domesticated like the ass, as the black cross on the back and shoulders of the latter animal prove the affinity between them. The voice of the zebra is very peculiar, and can hardly be described.

The ELEPHANT.—Of this magnificent animal, whose form is familiar to every eye, two species are known, the Indian and the African. The anatomy of the huge quadruped is well worthy of consideration. Its head and tusks are so very heavy that no long neck would bear them ; the neck is therefore very short. But this shortness of neck prevents the elephant from putting its head to the ground, or from stooping to the water's edge. This apparent defect is compensated by the wonderful manner in which its upper lip and nose are elongated, and rendered capable of drawing up water or plucking grass. In the proboscis or trunk there are about forty thousand muscles, enabling the elephant to shorten, lengthen, coil up, or move in any direction this most extraordinary organ. The trunk is pierced throughout its length by two canals, through which liquid can be drawn by suction. If the elephant wishes to drink, after drawing the liquid into its trunk, it inserts the end of its proboscis into its mouth, and discharges the contents down its throat ; but if it merely wishes to wash itself or play, it blows the contained liquid from the trunk with great violence. Through the trunk the curious trumpet-like voice of the elephant is produced. At the extremity is a finger-like appendage, with which it can pick up small objects. In order to sustain the muscles of the jaw and neck, the head must be very large ; were it solid, it would be very heavy. The skull is therefore formed of a number of cells of bone, forming the necessary expanse without the weight, leaving but a very small cavity for the brain.

This fact will account for the numberless bullet wounds which an elephant will endure in the skull. The ball, instead of penetrating to the brain, merely lodges among the bony cells, and does no great mischief. Not long since, a ball was found firmly imbedded in the tusk of an elephant ; it was thoroughly impacted, and there was no apparent opening by which it could have reached the place that

it occupied. It was afterward found that the ball must have struck the elephant at the base of the tusk, so as to have sunk among the soft and as yet unformed ivory. This by degrees was pushed on as the tusk grew in successive years, until it was at last surrounded closely by hard ivory. A spear-head has been also found similarly imbedded.

The Indian Elephant is almost invariably taken from its native haunts and



AFRICAN ELEPHANT.—*Loxodonta Africana*.

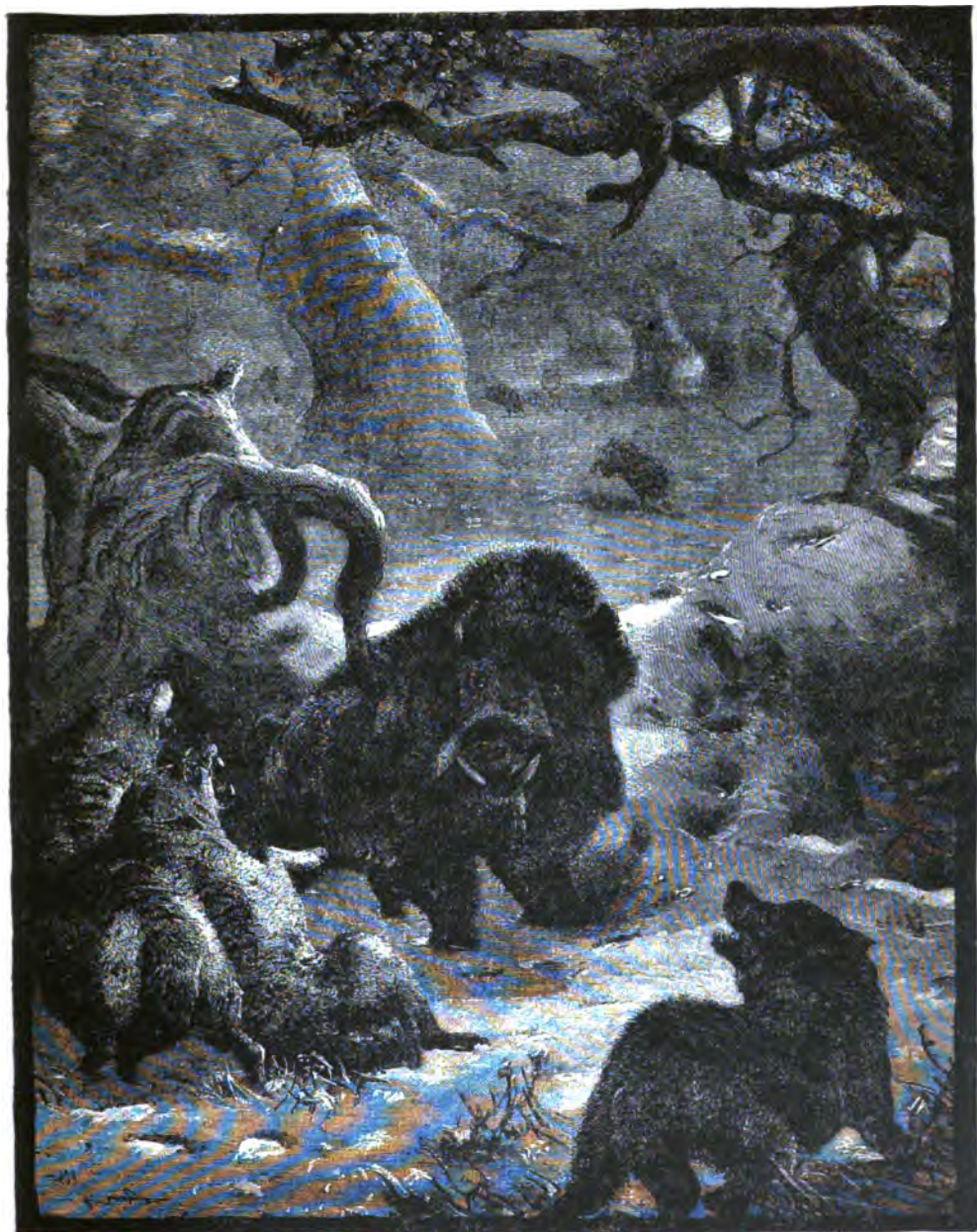
then trained. The Indian hunters proceed into the woods with two trained female elephants. These advance quietly, and by their blandishments so occupy the attention of any unfortunate male that they meet, that the hunters are enabled to tie his legs together and fasten him to a tree. His treacherous companions now leave him to struggle in impotent rage, until he is so subdued by hunger and fatigue that the hunters can drive him home between their two tame elephants. When once captured he is easily trained.

In captivity, it is very docile and gentle, but sometimes when provoked, will take a very ample revenge. Of this propensity, many anecdotes are told. The tusks and teeth of the elephant furnish exceedingly fine ivory, which is used for various purposes, such as knife-handles, combs, billiard-balls, etc. There is a great art in making a billiard-ball. Some parts of the tusk are always heavier than others, so that if the heavy part should fall on one side of the ball, it would not run true. The object of the maker is either to get the heavier portion in the centre, or to make the ball from a piece of ivory of equal weight. In either case, the ball is made a little larger than the proper size; it is then hung up in a dry room for several months, and finally turned down to the requisite dimensions. All elephants are fond of the water, and sometimes submerge themselves so far that nothing but the tip of the proboscis remains above the surface. In a tame state, the elephant delights in concealing itself below the water, and deluging the spectators with a stream sent from its trunk.

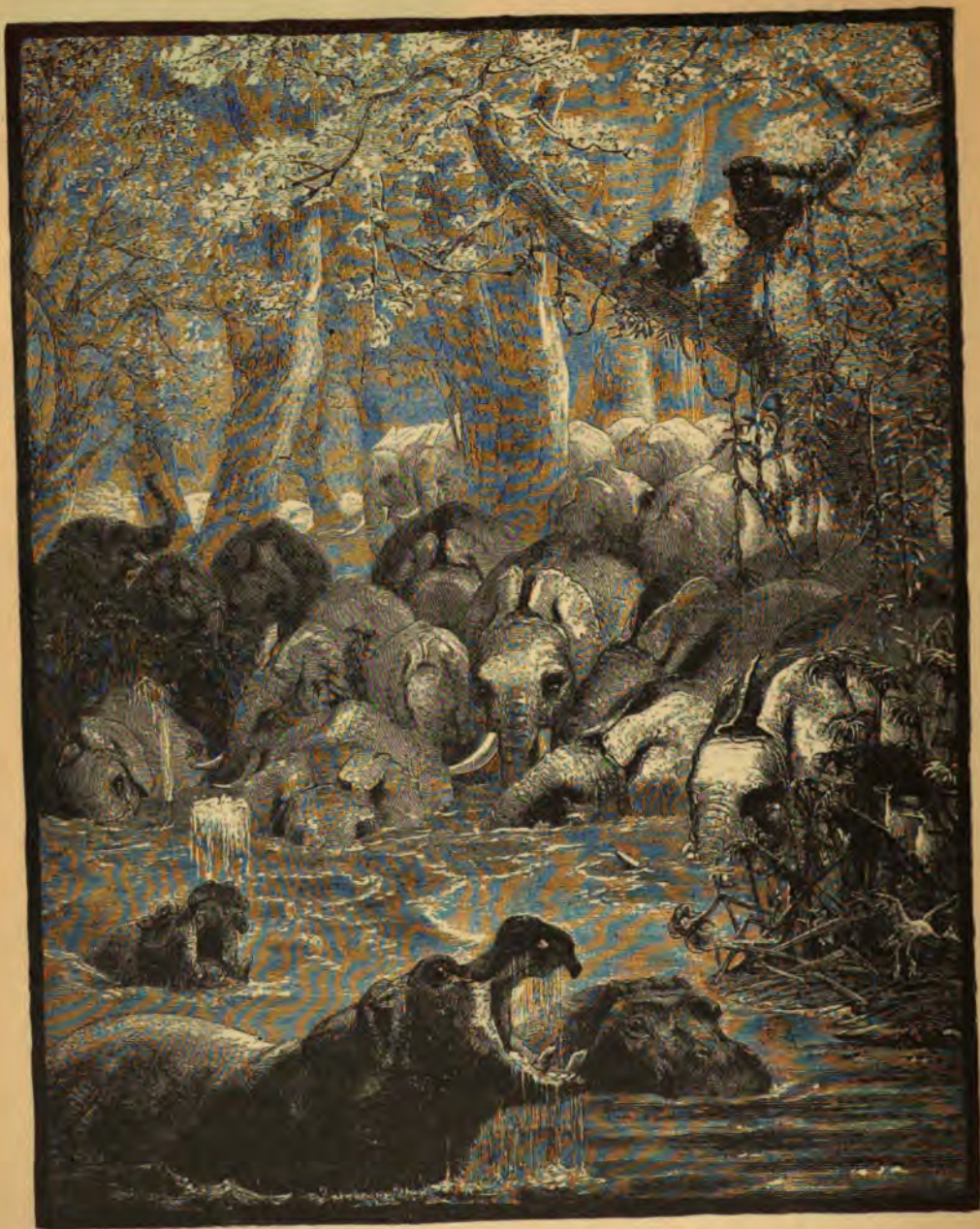
The African Elephant is distinguished from the Indian Elephant by the markings of its teeth and some differences in form.

The TAPIR forms one of the links connecting the elephant with the hog. The snout is lengthened into a kind of proboscis like that of the elephant, but it is comparatively short, and has no finger-like appendage at the extremity. Some of the remaining links are supplied by the various species of the fossil genus *Palæotherium*.

The Common Tapir is spread throughout the warmer regions of South America. It sleeps during the day, and wanders about at night in search of its food, which consists of watermelons, gourds, and other vegetables. It is very fond of the water, and can remain below the surface for a considerable period. It is a very powerful animal, and as it is furnished with a very thick hide, it plunges through the brushwood, breaking its way through any obstacles that may oppose its progress. Its disposition is gentle, but when annoyed it sometimes rushes at its antagonist, and defends itself vigorously with its powerful teeth. The jaguar frequently springs on it, but is often dislodged by the activity of the tapir, who rushes through the bushes immediately that it feels the claws of its enemy, and endeavors to brush him off against the thick branches. The height of the American Tapir is from five to six feet. The Malay Tapir is somewhat larger, and is known by the grayish white color of the loins and hind quarters, which give the animal an appearance as if a white horse-cloth had been spread over it.



WILD BOAR.



ELEPHANTS AND HIPPOPOTAMI.

The BOAR.—The animals composing the Hog tribe are found in almost every part of the globe. Their feet are cloven and externally resemble those of the Ruminants, but an examination of the bones at once points out the difference. The Wild Hog or Boar inhabits many parts of Europe, especially the forests of Germany, where the chase of the wild boar is a common amusement. In our Southern States the woods are full of half wild ones. Its tusks are terrible weapons, and capable of being used with fatal effect. They curve outward from the lower jaw, and are sometimes eight or ten inches in length. In India, where the boar attains to a great size, the horses on which the hunters are mounted often refuse to bring their riders within spear stroke of the infuriated animal, which has been known to kill a horse and severely injure the rider with one swoop of its enormous tusks.

The DOMESTIC HOG scarcely needs any description. It is by no means the unclean and filthy animal that moralists love to represent it. It certainly is fond of wallowing in the mire, as are the elephant, tapir, etc., but no animal seems to enjoy clean straw more than the hog. We shut it up in a dirty narrow crib, give it any kind of refuse to eat, and then abuse it for being a dirty animal and an unclean feeder.

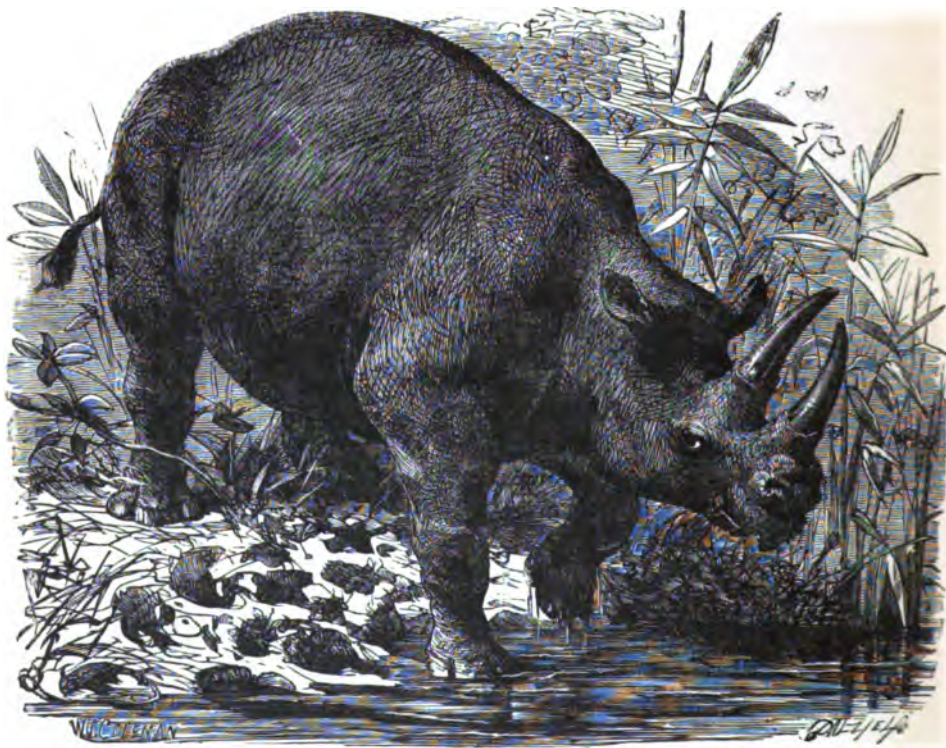
The BABYROUSSA inhabits the Molucca Islands and Java. It is remarkable for possessing four tusks, two of which proceed from the upper jaw, and do not pass out between the lips, but through an aperture in the skin, half way between the end of the snout and eyes. The sockets of the two upper tusks are curved upward, and give a singular appearance to the skull of the animal. It looks a ferocious animal, nor do its looks contradict its habits, as it is very savage, and cannot be hunted without danger. Yet when taken young it can be tamed without much difficulty, and conducts itself much after the manner of a well-behaved pig.

Only the male possesses the remarkable double pair of tusks, the female being destitute of the upper pair, and only possessing those belonging to the under jaw in a rudimentary degree. It lives in troops, as do most of the hog kind, and thus does great damage to the cultivated grounds, especially to the maize, a plant to which it is, unfortunately, very partial. It is a good swimmer, and often voluntarily takes to the water in order to cross to another island. The size of the animal when full grown is about that of a very large hog.

The RHINOCEROS.—There are, apparently, six species of this formidable animal, inhabiting various parts of Asia and Africa. They can be distinguished from each other by the number and shape of their horns, and the color of their bodies. Their habits are much alike.

The rhinoceros is always a surly and ill-tempered animal, and is much given to making unprovoked attacks on man and beast, if it should happen to fancy itself insulted by their presence. Their chief peculiarity, the so-called horn, is a mass of fibres matted together, and closely resembling the structure of whalebone. Their feet are divided into three toes, encased in hoofs. The horn is not connected with

the skull, but is merely a growth from the skin, from which it can be separated by means of a sharp penknife. Being made of very strong materials, it is employed in the manufacture of ramrods, clubs, and other similar implements. When prop-



KEITLOA, OR SLOAN'S RHINOCEROS.—*Rhinoceros Keitloa*.

erly worked, it is capable of taking a very high polish, and is often cut into drinking-cups.

The organs of scent of the rhinoceros are very acute, and as the creature seems to have a peculiar faculty for detecting the presence of human beings, it is necessary for the hunters to use the greatest circumspection when they approach it, whether to avoid or kill, as in the one case it may probably be taken with a sudden fit of fury, and charge at them, or in the other case, it may take the alarm and escape. The upper lip is used by the rhinoceros as an instrument of prehension, with which it can grasp the herbage on which it feeds, or pick up small fruit from the

ground. The very tame rhinoceros in the Zoological Gardens will take a piece of bun or biscuit from a visitor's hand by means of its flexible upper lip.

The HIPPOPOTAMUS.—There is, in all probability, but one species of hippopotamus. It inhabits Africa exclusively, and is found in plenty on the banks of many rivers in that country, where it may be seen gambolling and snorting at all times of the day. These animals are quiet and inoffensive while undisturbed, but if attacked, they unite to repel the invader, and have been known to tear several planks from the side of a boat, and sink it. They can remain about five or six minutes under water, and when they emerge they make a loud and very peculiar snorting noise, which can be heard at a great distance. The hide is very thick and strong, and is chiefly used for whips. The well-known "cow-hides" are made of this material. Between the skin and flesh is a layer of fat, which is salted and eaten by the Dutch colonists of Southern Africa. When salted it is called Zee-koe speck, or Sea-cow's bacon. The flesh is also in some request.

The hippopotamus feeds entirely on vegetable substances, such as grass and brushwood. The fine animal now in the possession of the Zoological Society eats all kinds of vegetables, not disdaining roots. This individual is peculiarly interesting from being the first hippopotamus brought to this country for many years, and is in all probability the first that has ever reached these shores.

From the construction of the head, the animal is enabled to raise its eyes and nostrils above the water at the same time, so that it can survey the prospect and breathe without raising more than an inch or two of its person from the water. In order to attain this object, the eyes are very small, and placed very high in the head, while the muzzle is very large, and the nostrils open on its upper surface. Cumming relates that the track of the hippopotamus may be readily distinguished from that of any other animal by a line of unbroken herbage which is left between the marks of the feet on each side, as the width of the space between the right and left legs causes the animal to place its feet so considerably apart, as to make a distinct double track. The teeth of the hippopotamus are the mainstay of the dentist, who cuts from the tusk of a hippopotamus those series of elegant teeth which replace those that age or accident has struck out of the human mouth. The ivory is exceedingly hard, and does not readily lose its beautiful whiteness, being properties which render it especially valuable for such purposes. This is supposed by many to be the animal called Behemoth in Scripture.

The SEALS and WHALES, although they are truly mammalia, are inhabitants of the water, and specially formed for an aquatic existence.

The fore feet of the seal are used as fins, and the two hinder feet almost as the tail of a fish, to assist and direct its course. On land the movements of this animal are very clumsy; it shuffles along by means of its fore feet, or rather paddles, and drags its hind feet after it.

Seals live during warm weather mostly in the cold regions of the north and south poles, and go into milder waters in the winter. Their food is chiefly fish, and they sometimes chase salmon quite far up rivers. Occasionally one comes



SEAL.—*Phoca vitulina*.

into New York Bay, and lately many have been seen in the Connecticut River. They like to bask in the sun upon rocks, sand-banks, or ice-floes, always keeping a good lookout for danger. They can see far, and their sense of smell is very sharp.

Seals live mostly on mollusks, crabs, and fish. In the winter they make holes in the ice, where they can come up to breathe. Sometimes one comes out to eat a fish. The Esquimaux watch near seal holes until one is seen coming up, then crawl softly along on the ice, making a cry like a seal, and the poor animal, who takes it for another seal, does not discover its mistake until it gets a deadly blow.

Seals are among the most useful of animals to man. The Greenlanders use their flesh for food; their oil for light, warmth, and cooking; their skins for clothes, boots, and coverings of boats and tents; their sinews for thread and fishing-lines; the skins of the entrails for window-curtains and shirts; and their blood for making soup. Seal-skins are an important article of commerce, and the seal fishery is largely carried on along the coast of Newfoundland and Labrador, and also on the islands off the coast of Alaska. The fur in its natural state is yellowish, spotted and marked with brown, and is unfit for use until it is dyed. Dressed seal-skins are largely used for ladies' cloaks, capes, etc. The skins are tanned sometimes and made into a fine soft leather for pocket-books, card-cases, and other things. Seal oil, made from the blubber or fat, is more valuable than whale oil.

Near the city of San Francisco, and not far from a hotel on the shore, is a rock

called Seal Rock, which is usually covered with seals, who sport there all day long, to the great amusement of the people, who watch them from the hotel piazza. They are not at all afraid, for no one is permitted to harm them. In warm sunny days they may be seen climbing up on to the rocks and sliding down again into the water, barking as if they enjoyed it. Some sleep in the sun, wake up and bark, slide down into the sea, and then crawl up again and bark and bark, keeping it up all day long.

The length of the common seal is about four or five feet, and its weight often two hundred and twenty-four pounds. When surprised basking on the shore, it scrambles off toward the water; but if intercepted, dashes at its antagonist, oversets him if possible, and makes its escape as fast as it can.

There are many seals known, among which are the Sea Leopard, a spotted species; the Harp Seal, so called because the markings on its back resemble a lyre; the Sea Bear and the Sea Lion.

The WALRUS inhabits the northern seas, but has been known to visit our coasts. Three instances of this have happened. The most remarkable point in the walrus is the great length of its upper canine teeth, which extend downward for nearly two feet, and resemble the tusks of the elephant. They furnish very fine ivory, and are extensively used by dentists in making artificial teeth, as teeth made from them remain white much longer than those made from the tusks of elephants. These tusks are used by the walrus for climbing the rocks or heaps of ice, and also for digging up the sea-weeds on which the animal mostly subsists. It will also eat shrimps and young seals. The walrus is often hunted for the sake of its oil, its flesh, its skin, and its teeth. It is generally found in troops; and if one is wounded, its companions rush to its rescue, and attack the enemy with their sharp tusks, which they have been known to drive through the bottom of a boat. The length of the walrus is about fifteen or sixteen feet, and it yields from twenty to thirty gallons of excellent oil.

The CETACEA, or WHALE tribe, closely resemble the fishes, and have often been placed among these animals by naturalists. They, however, are distinguished by possessing warm blood, and, in consequence, being forced to rise at intervals in order to breathe the air, instead of separating from the water, by means of their gills, sufficient oxygen for supporting life. Yet the whale remains under water for a time so much longer than could be borne by any other warm-blooded animal, that the most indifferent observer cannot fail to perceive that the whale is furnished with some plan for supporting life during its stay under the water. The manner in which this object is attained is at once beautiful and singular. Every one knows that the object of breathing is to oxygenize the blood, which in its course through the body becomes deprived of its native qualities, and is actually poisonous. If the blood is not renewed, it causes apoplexy and death, as is the case when a person is strangled or drowned. The most natural way to supply this want in the whale

would be to give it much larger lungs, in order that it might take into its body a reservoir of air, from which the blood might be renewed. But if this were the case, the animal would be seriously inconvenienced by such an amount of air, which would make it too buoyant, and prevent it from diving into the depths of the sea. But there must be a reservoir somewhere, and, therefore, instead of a reservoir of air to arterialize the blood, there is a reservoir of blood already arterialized.

Along the interior of the ribs there is a vast collection of blood-vessels, ramifying from one another, and capable of containing a large quantity of blood, having no immediate connection with that portion of the blood which is already circulating in the body. As fast as the exhausted and poisonous blood returns from its work, it passes into another reservoir adapted for its necessities, while a portion of the arterialized blood in the arterial reservoir passes into the circulation. It will be seen from this statement, that the whale, and others of the same order, possess more blood in proportion than any animals. By means of this wonderful apparatus, a whale can remain below the water for more than half an hour at a time. The depths to which the whale can descend are astonishing, wounded whales having been known to take down perpendicularly nearly 800 fathoms of line. The pressure of the water at this depth is very great, amounting, according to Scoresby's calculation, to 211,200 tons. This pressure would certainly cause the water to burst through their nostrils, and enter the lungs, were it not that the nostrils are formed so as to close themselves more firmly as the pressure of water increases.

The great Greenland Whale is found in the northern oceans, living amid ice and perpetual cold. Many ships are annually fitted out for the capture of this creature, which, unhappily for itself, furnishes oil and whalebone. The oil is obtained from the thick layer of fatty substance, called blubber, which lies immediately under the skin; and the whalebone—which, by the way, is not bone at all—is obtained from the interior of the mouth, where it fringes the jaws, and acts as a sieve for the whale to strain his food through. The throat of the Greenland whale is so small that the sailors, who always use forcible expressions, say that a penny loaf would choke a whale. The greater portion of its food consists of a little creature, about an inch and a half long, called *Clio borealis*, one of the marine Mollusca, belonging to the class Pteropida, or wing-footed creatures, so called because it propels itself through the water with two wing-like organs. The whale, when it wishes to feed, rushes through the water with its immense jaws wide open, enclosing a host of little sea animals and a few hogsheads of water. As the whale only wants the animals, and not the water, it shuts its mouth, and drives all the water out through the fringes of whalebone, leaving the little creatures in its jaws.

The whale shows great attachment to its young, which is called the cub, and on the approach of danger seizes it with its fin or flipper, and carries it down out of the way. The whale has no fins, properly so called, as it is not a fish, but one of the mammalia. Its flippers, which supply the place of fins, are in fact fore legs, fur-

nished with a kind of hand covered with a thick skin. They seem to be principally employed in balancing the animal. The hind legs are wanting. The length of this whale averages sixty feet. Its tail is placed transversely, and not vertically, as in the fishes.

The CACHALOT.—This animal is not furnished with "baleen," or whalebone, but is armed with a number of strong conical teeth, which are placed in the lower jaw, and which are often used in defending itself from the attacks of the whalers' boats. In the Museum at Oxford is an under jaw-bone of this whale, sixteen and a half feet in length, containing forty-eight huge teeth. Besides this method of defence, it has a very unpleasant habit of swimming off to a distance, and then rushing at the boat with its head, thereby knocking it to pieces. One of these whales actually sank a ship by three or four blows from its head.

Spermaceti is obtained from the head of the cachalot, and it is this substance that causes the immense size of the head. When the whale is killed, a hole is made in the upper part of the head, and the spermaceti is baled out with buckets. When just procured it is almost fluid, but is rendered solid and transparent by being first drained of its oil, then boiled in water, and lastly set to cool in wide pans, where it soon assumes the white flaky appearance so well known in this country. The skull of the cachalot occupies a comparatively small portion of the head, the huge mass at the end of the mouth being composed of a gristly kind of substance. The bone of the upper jaw occupies about one fourth of the distance between the mouth and the top of the snout. It runs backward nearly straight until just before the eyes, when it joins the remainder of the skull with a bold sweep. That part of the skull is called "Neptune's chair" by the sailors, and is the part where the spermaceti is found. The layer of blubber is thin, but yields a fine and valuable oil. Ambergris, so long a riddle to all inquirers, is now found to be produced in the interior of the cachalot. This substance is of the consistency of wax, inflammable, and gives out a kind of musky odor. It was once in great repute as a medicine, but is now only used as a perfume. The cachalot, although an inhabitant of the Arctic seas, has sometimes been found and captured off our coasts. The length of this whale is about seventy feet.

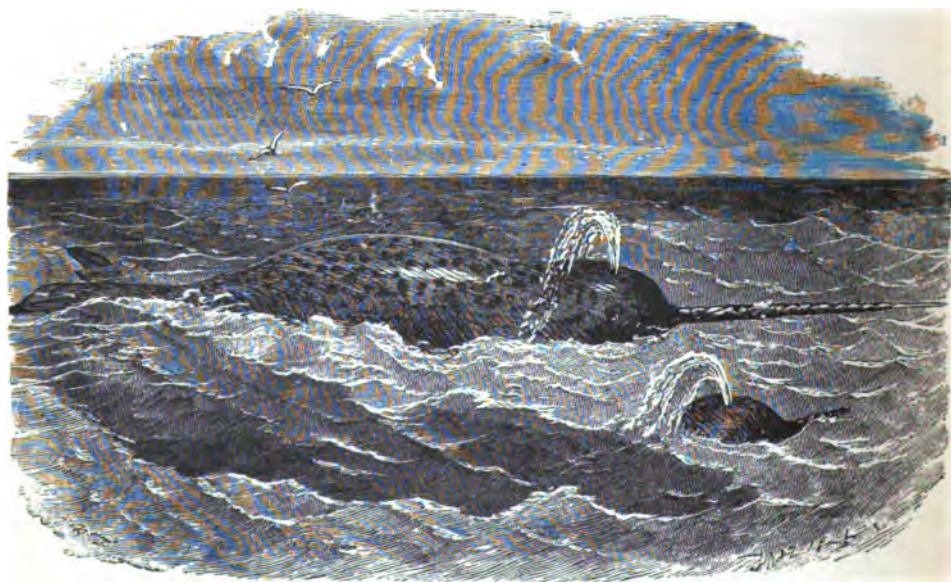
Those readers who have formed their ideas of DOLPHINS from the very graceful and elegant creatures represented under that name in the pictures of the "old masters," or the statues of the ancient sculptors, will find that the real animal differs as much from the ideal as the red and green lions wearing golden collars, represented in heraldry, differ from the lion of Africa. Sad to say, almost the whole history of the dolphin is imaginary—very poetical, but very untrue. The red and blue colors of the heraldic lion are not less fabulous than the changing tints of the dying dolphin, so dear to poetry. Alas! our unpoetical dolphin, when we have harpooned and brought him on deck, is only black and white, and all the change that he makes is that the black becomes brown in time, and the white

changes to gray. The creature that really displays these colors when dying is a fish called the Coryphene, and not a cetaceous animal of any kind. The sailors generally call it the dolphin, which has led to the mistake.

We will leave poetry and its beautiful errors, and pass on to facts. The dolphin is, like the whale, a warm-blooded animal, suckles its young, and is forced to come to the surface in order to breathe. Its snout is very long, and is apparently used for capturing such fish, and other animals, as live in the mud. Its length is from six to ten feet, and several species are known.

The PORPOISE.—These animals may be observed in plenty playing their absurd antics off every coast of America. There are numbers of them off the Nore, a place which they frequent greatly, as it is the mouth of a river, and they find more food there than in the open sea. They tumble at the surface of the water for the purpose of breathing. In olden times, when glass windows were considered an effeminate luxury, and rushes supplied the place of carpets, the flesh of the porpoise constituted one of the standard delicacies of a public feast, but it has long since been deposed from its rank at the table. Like most of the Cetacea, its flesh has a very strong oily flavor, which, however relished by an Esquimaux, is not agreeable to the palate of a European epicure of the present day.

The voracity of the porpoise is very great. It feeds on various fishes, but its



NARWHAL.—*Monodon Monoceros*.

great feasts are held when the periodical shoals of herrings, pilchards, and other fish arrive on the coasts. In the pursuit of its prey it frequently ventures some distance up a river, and is then often taken in nets by the fishermen.

The teeth of this animal are very numerous, and interlock when the jaws are closed, so that the fish, when once seized, cannot escape. Its length is about five feet, its color a rich black, becoming white on the under side.

The NARWHAL.—Although the narwhal has not suffered from false reports so much as other animals, yet it has unwittingly contributed to propagate a very old error. The spiral tusk of the narwhal was accustomed to be sold as the real horn of the unicorn; and as an accredited part of that animal, forming direct proof of its existence, it used to fetch a very high price. Of course, when the whale fishery was established, the real owner of the horn was discovered, and the unicorn left still enveloped in mystery.



MANATEE.—*Manatus Australis*.

The name Monodon is not strictly correct, as the narwhal possesses *two* of these tusks, one on each side of its head. Only the left tusk projects, the other remaining within the head. Sometimes a specimen has been found with both tusks projecting, and some think that when the left tusk has been broken off by accident, the right one becomes large enough to supply its place. Although an inhabitant

of the northern seas, it has several times visited our coasts. Its body is from thirty to forty feet in length, and its tusk from five to nine. The Manatees and Dugongs belong to the Cetacea.

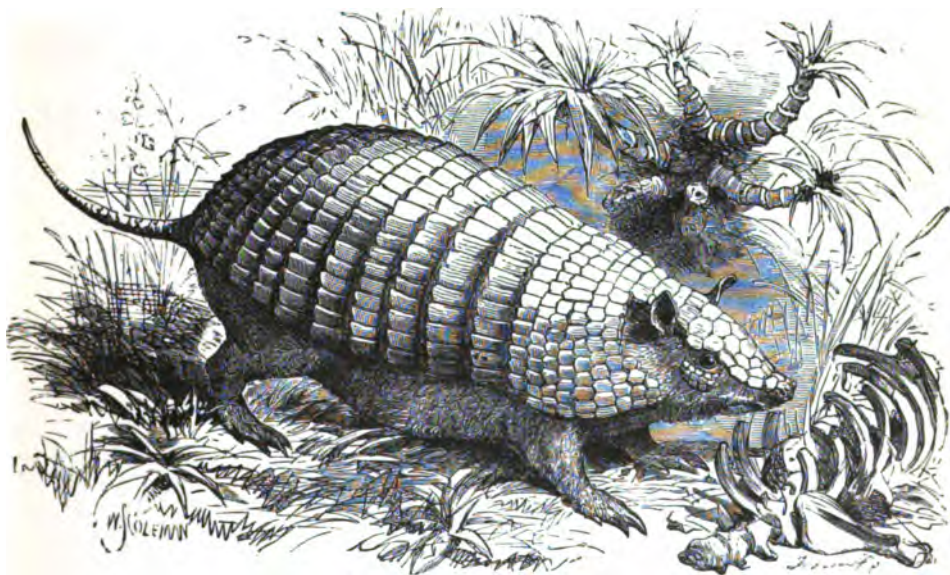


SLOTH.—*Cholapus didactylus*.

The EDENTATA include the Ant-eaters and the Pangolins, which possess no teeth at all, and the Sloths, Armadillos, etc., whose teeth are small and of peculiar structure. The SLOTH, or Ai, is another example of the errors into which even great naturalists are led from hasty observation. The great Cuvier himself condemns the sloth as a degraded and miserable animal, moving with pain, and misshapen in form. Yet no animal is more fitted for its position than the sloth. "The sloth," says Waterton, "in its wild state, spends its whole life in the trees, and never leaves them but through force or accident, and what is more extraordinary, not upon the branches, like the squirrel and monkey, but under them. He moves suspended from the branch, he rests suspended from the branch, and he sleeps suspended from the branch." In fact, as Sidney Smith observes, he passes a life of suspense. To render it fit for this singular mode of life, its long and powerful arms are furnished with strong curved claws, which hook round the branches, and keep the animal suspended without any effort. When on the ground, these claws are very inconvenient, and it can barely shuffle along; but when it is among its native branches, it moves with exceeding rapidity, particularly in a gale of wind,

when it passes from branch to branch, and from tree to tree, with an activity which its movements on the ground by no means portend.

The MANIDÆ or PANGOLINS are immediately known by the peculiar, strong, horny plates with which their bodies are defended, giving them the appearance of animals enveloped in a suit of scale armor. When attacked they roll themselves up, wrap their tails round them, and raise the whole array of sharp-edged scales with which their body is covered, and bid defiance to almost any enemy except man. They live on ants and termites, or white ants, as they are called, which they take by thrusting their long, slender tongue among the ants, which adhere to it by a gummy saliva. When the tongue is covered it is rapidly retracted, and the ants swallowed. To obtain the ants, the pangolins are furnished with powerful claws to tear down the dwellings of their prey. The Long-tailed Manis is widely scattered through Africa, but is not very common. The length of its body is about two feet, and that of its tail rather more than three. The Short-tailed Manis, or Bajjerkeit, is very common in India. Its entire length is about four feet.



ARMADILLO.—*Dasyus sexcinctus*.

The ARMADILLOS live exclusively in the warmer parts of America. They eat carrion, insects, and sometimes fallen fruit. The great mainstay of these animals lies in the number of bisons annually slaughtered for the sake of their hides. The carcasses of these animals are left to rot on the plain, and would speedily do so did not

the combined effect of birds and beasts soon destroy every trace of the animal and only leave a heap of bones. In this work the armadillo takes his full share. The armor that covers them, instead of resembling scale armor like that of the manis,

forcibly reminds the observer of the modified plate armor worn in the time of Charles I. They burrow with great rapidity, and can only be forced from their refuge by smoke or water. When they are hunted and are very close pressed, they either endeavor to escape their foes by rapidly burrowing into the earth, or try to oppose a partial resistance by rolling themselves up and trusting to the protection of their armor. The natives and colonists consider them great delicacies when roasted in their shells.

The ANT-EATER. — This curious animal inhabits Guiana, Brazil, and Paraguay. As its name imports, it lives principally upon ants and termites, which it procures in precisely the same manner as was related of the manis. Its short legs and long claws would lead an observer to suppose that its pace was slow and constrained, but when chased, it runs off with a peculiar trot, and with such rapidity that it keeps a horse to its speed to overtake it. The tongue of this animal looks exactly like a great red worm, and when the creature is engaged in devouring its food, the rapid coil-



LITTLE ANT-EATER.—*Cyclothorus didactylus*.

ing and twisting of the tongue add in no small degree to the resemblance. The claws are very long and curved, and as they are used in tearing down the habitation of the termites or white ants, as they are called, are exceedingly strong. They are placed on the foot in such a manner that when the animal is walking, its

weight rests on the outside of the fore feet and the outer edge of the claws, which make a great clattering if the ant-eater is walking upon a hard surface.

When it sleeps, it lies on one side, rolls itself up, so that its snout rests on its breast, places all its feet together, and covers itself with its bushy tail. The fur of the animal at all times resembles hay, and when it is thus curled up in sleep, it is so exactly like a bundle of hay, that any one might pass it carelessly, imagining it to be nothing but a loose heap of that substance. Schomburgh relates that a tame ant-eater, in his possession, by no means restricted itself to ants, but devoured meat, when minced, with much avidity. The same naturalist also discovered a *julus*, or millipede, in the stomach of an ant-eater which he dissected. The ordinary length of this animal is about three feet seven inches, and its height about three feet.

The DUCK-BILLED PLATYPUS.*—Australia, where everything seems to be reversed, where the north wind is warm and the south wind cold, the thick end of a pear is next the stem, and the stone of a cherry grows outside, is the residence of this most extraordinary animal. When it was first introduced into Europe, it was fully believed to be the manufacture of some impostor, who with much ingenuity had fixed the beak of a duck into the head of some unknown animal. It will, however, be seen by the woodcut representing the skull of the animal, that this duck-like beak really belongs to the animal, and is caused by a prolongation of some of the bones of the head. It lives by the banks of rivers, in which it burrows like the water-rat. Curiously enough, it finds no difficulty in this labor, for the feet are so constructed that the animal can fold back the web at pleasure, and thus the foot is enabled to perform its task. It feeds upon water-insects and shell-fish, always rejecting the crushed shells after swallowing the inhabitant. The male has a sharp spur on its hind feet. The learned have given the animal several names. Some follow Shaw, and call it *Platypus Anatinus*; some give it the name of *Ornithorhynchus rufus* or *fuscus*, or *crispus* or *brevirostris*, with other titles. The native name for the creature is "Mullingong," a title which, although not euphonious, is perhaps little less so than the scientific names, while it certainly has the advantage over them in point of brevity.

BIRDS.

Birds are immediately distinguished from the *Mammalia* by their general form, their feathery covering, and by producing their young enclosed in eggs. The different orders of birds are principally known by the character of the claws and beak, examples of which will be seen in the progress of the work. Before we pay attention to any individual species, we will first examine some of the structures common to all birds. One of the first great marks of distinction in birds is the

* The word "Platypus" signifies broad-footed, and is derived from the Greek words, *πλατύς*, broad, and *πούς*, a foot.

wing. This organ is a modification of the arm or fore limb of mammalia, clothed with feathers instead of hair.

The bones of adult birds are not filled with marrow like the bones of Mammalia, but are hollow and filled with air, and are therefore rendered very light, a bone of a goose being barely half the weight of a rabbit's bone of the same size, after the marrow has been extracted. In this formation, strength as well as lightness is consulted, as a tubular rod is well known to be very much stronger than the same quantity of matter formed into a solid bar. The bones forming the wing are worthy of notice for the beautiful manner in which they are jointed together, and arranged so as to give great strength together with lightness. Unscientific individuals are apt to make certain mistakes in their ideas of birds, and especially as regards the formation of their legs. Most persons seem to fancy that the foot of the bird is that part which grasps the branch, or by means of which it walks on the ground, that the joint above that member is the knee, and that the thigh is the feathered portion of the limb that proceeds from the bird's body. Now, all these ideas are wrong; with this method of arrangement, the knee of the bird would bend backward, a thing which no perfectly formed knee ever did or ever will do.

The leg of a bird is formed on much the same principle as the hind leg of a quadruped, the part that grasps the branches being composed of the *toes*, the so-called knee-joint being the heel bone of the foot, so that the whole foot reaches half-way from the perch to the bird. The knee-joint is placed high up against the body, and is buried in the feathers. It will be seen that the great tendon, which is connected with all the toes or claws, passes over the joints in such a manner that when the leg is bent, the tendon is shortened and the claws drawn together, so that the weight of the bird while perched, pressing on the tendon, holds it firmly on the branch. This action of the tendon is easily observed by watching a common fowl walk. At each step that it makes, on lifting its foot, the claws are seen to be drawn together. It is partly by this power that the birds of prey are enabled to fix their talons so forcibly into the bodies of their prey. When, for example, an eagle wishes to drive its claws into its prey, he perches on it, and then sinks down with the whole weight of his body, by which movement the tendon is shortened, and the claws forcibly pressed together.

As the wing presents a very broad surface to the air, it is necessary that very powerful muscles should be used to move it with sufficient rapidity. The pectoral muscles are therefore enormously developed, extending almost the whole length of the body, as every one who has carved a fowl must have seen; and in order to form an attachment for these immense muscles, the ridge of the breast-bone is equally enlarged. It is the want of these enlarged muscles that prevents man from flying, even when he has attached wings to his arms. The principal characteristics of birds are taken from their foot and beak.

The LAMMERGEYER (Germ. *Lamb's-vulture*), or BEARDED VULTURE, inhabits



LAMMERGEYER AND CHAMOIS.

most mountain ranges, and is very common in the Alps of Switzerland and Germany, where, from its depredations on the kids and lambs, it has earned its name of *Lämmergeyer*. Although called the Bearded "Vulture" it is not strictly a vulture, as its head and neck are feathered, and it rejects putrid flesh, unless hard pressed by hunger. It destroys hares, and young or sickly sheep and goats, nor, when rendered fierce by hunger, does it fear to attack the adult chamois, or even man. It is said to destroy the larger animals by watching until they are near the brink of a precipice, and then suddenly driving them over the rocks by an unexpected swoop. In this manner the strong and swift chamois falls a victim to the craft of its winged foe, and instances are not wanting where the chamois-hunter himself has been struck from a narrow ridge into the valley beneath by a blow from this ferocious bird. It is exceedingly bold, and shows but little fear of man. While Bruce was preparing his dinner on the summit of a mountain, one of these birds, after scalding its feet in several unavailing attempts to extract some meat out of the boiling water, actually seized a piece from a platter, and went off with it. The name of "Bearded" Vulture is given to it on account of the long tuft of hairs with which each nostril is clothed. The length of its body is about four feet, and the expanse of its wings from nine to ten. The second and third primary feathers are the longest. It lays two eggs—white, marked with brown blotches.

The CONDOR.—The *Sarcorhamphidæ* are distinguished by a fleshy tuft growing on their beaks, somewhat resembling the wattles of a turkey. The genus *Sarcorhamphos* includes the Condor, the King Vulture, and the Californian Vulture. These birds are distinguished by the wattles on their beaks, their naked necks, and the size of the nostrils. The third primary feather is the longest. The condor inhabits the Andes of South America, always choosing its residence on the summit of a solitary rock. It appears that this bird does not build any nest, but lays its two white eggs on the bare rock after the manner of many sea-birds. It is a very large bird, but by no means the gigantic creature some former naturalists relate, with wings twenty feet in length, and powerful enough to carry off a horse. The real expanse of wing is about nine or ten feet, and the length of the bird about three feet. It is, however, exceedingly strong and tenacious of life. Two condors will attack and kill the llama, or even the puma; for by their repeated buffeting and pecking they weary it so completely that it yields to their perseverance.

We now arrive at the true VULTURES. These birds are the representatives of the carrion-devouring animals, such as the hyenas, wild dogs, etc. They however do not, as the hyenas and wild dogs, attack living animals. The neck of the vulture is almost naked, very slightly sprinkled with down, and from the formation of the lower part of the neck, the bird is enabled to draw its head almost under the feathers of its shoulders, so that a hasty observer would conclude that the creature had no neck at all. The marvellous quickness with which the vultures

discover a dead animal has caused many discussions among naturalists as to the sense employed; some, as Audubon, declaring entirely for sight, and others, as Waterton, asserting that the scent of putrid animal matter leads the vultures to their prey. He especially ridicules one experiment tried by Audubon, by stuffing a deer's hide, and placing it in the open air. The vultures soon came to the stuffed skin, and one of them tore open the skin just as if the animal had been really lying dead, and continued to pull out large quantities of straw, until it became tired and went away. Audubon argues from this experiment that the vultures were led to the bait by the sight, and not by the scent, or they would not have been so taken in as to work for so long a time at a stuffed skin. However, few people see the same incident in the same light, and Waterton's inferences are widely different from those drawn by Audubon. He declares that the experiment of stuffing a deer's hide, and placing it exposed in the open air, was by no means conclusive, as the hide, however dry, must have given out some odor, and the vulture certainly acted very properly in pulling out the straw, and endeavoring to get at the inside.

The probability is that both senses are used, one aiding the other; for in another experiment, where a dead hog was hidden under canes and briars, numbers of vultures were seen sailing in all directions over the spot, evidently directed by the scent, but unable to discover by their eyes the exact position of the animal. The olfactory nerves of the vulture are beautifully developed, so that Waterton had reason for his pathetic remark, "I never thought I should have lived to see this bird deprived of its nose."

The Griffon Vulture is found in almost all parts of the old world. It is one of the largest of its group, measuring upward of four feet in length. Like most of the vultures, it does not appear to move its wings while flying, but soars on expanded pinions in large circles, apparently gaining the necessary impetus by the movements of its head and body, just as an accomplished skater uses but little force in his various evolutions—an imperceptible inclination of the head, or sway of the body, sufficing to keep up the impetus gained at starting, and to bring him round in any direction he chooses. Vultures are generally protected by the natives of the countries where they reside, on account of their great utility in clearing away the putrid animal matter, which would otherwise be exceedingly injurious as well as disagreeable.

EAGLES.—The vultures seem to hold the same place among birds as the hyenas among the Mammalia; and in like manner the Falconidæ fill the same position in the ornithological kingdom as do the Felidæ among the quadrupeds. The beak of this family is strong and curved, and the feet furnished with sharp talons, just as the Felidæ are armed with long sharp teeth and powerful claws. The Falconidæ differ from the Vulturidæ in having feathered necks, and in killing their prey themselves, and devouring it while fresh.



BALD, OR WHITE-HEADED EAGLE.—*Haliaeetus Leucocephalus*.

At the head of the Falconidæ the EAGLES are placed. In them the wings are large, powerful, and slightly rounded, the fourth primary feather being the longest. The feet of the genus *Aquila* are feathered to the toes.

The noble bird which is represented on this page is celebrated as being the type which has been chosen by the American people as the emblem of their nation.

The name of Bald or White-headed Eagle has been applied to this bird on account of the snowy white color of the head and neck, a peculiarity which renders it a most conspicuous bird when at large in its native land. The remainder of the body is a deep chocolate brown, inclining to black along the back. The tail and upper tail-coverts are of the same white hue as the head and neck. In its earlier stages of existence the creature is of more sombre tints, not obtaining the beautifully white head and tail until it is four years of age.

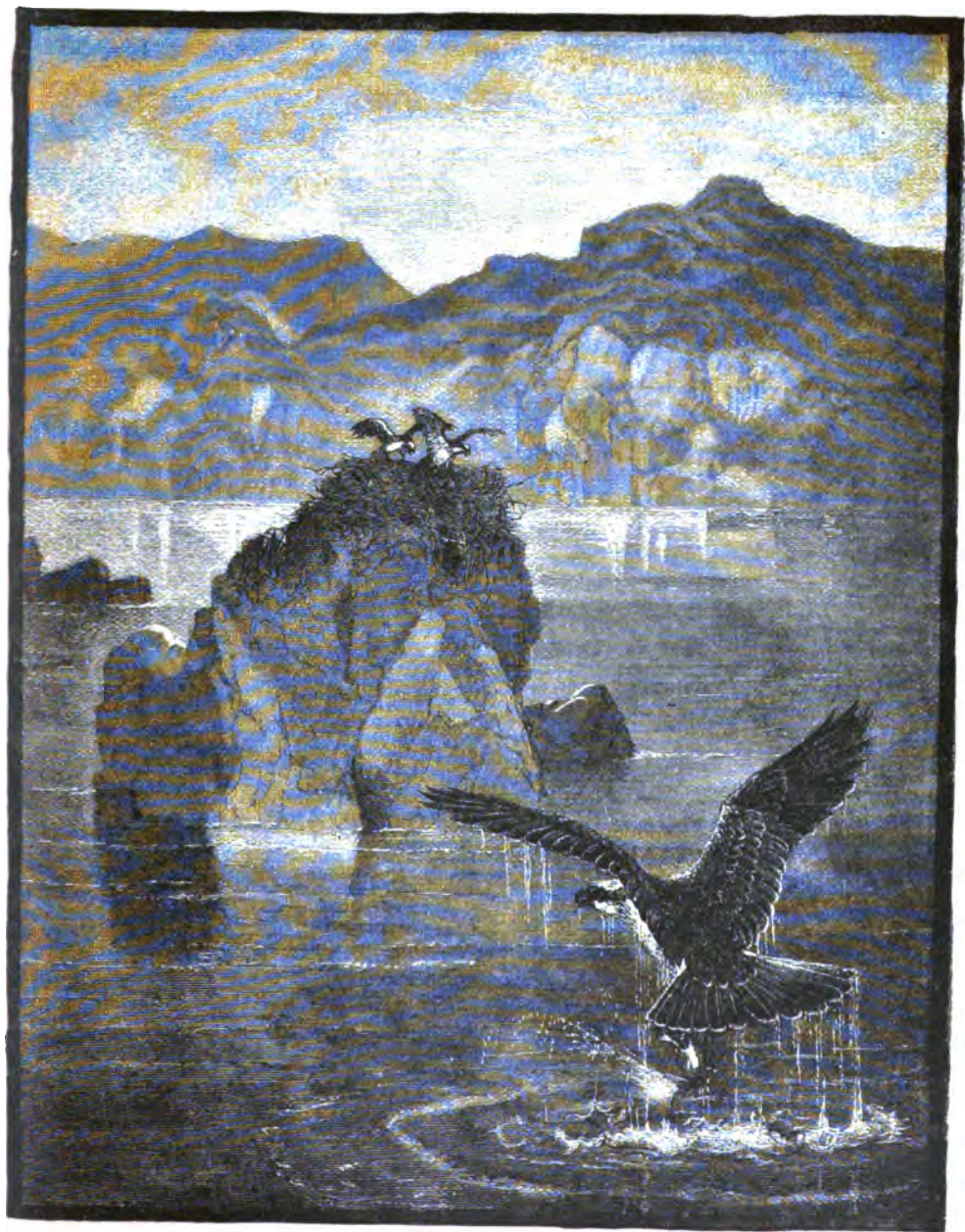
The nest of the bald eagle is generally made upon some lofty tree, and in the course of years becomes of very great size, as the bird is in the habit of laying her eggs year after year in the same nest, and making additions of fresh building materials at every fresh breeding season. She commences this task at a very early period of the year, depositing her eggs in January, and hatching her young by the middle of February. It is always a very affectionate bird, tends its young as long as they are helpless and unfledged, and will not forsake them even if the tree on which they rest be enveloped in flames.

The bald eagle often takes advantage of the fishing talents of the osprey by robbing the lesser bird of its prey. The eagle is, in truth, no very great fisher, but is very fond of fish, and finds that the easiest mode of obtaining the desired dainty is to rob those who are better qualified than himself for the sport. He is capable of catching fish, it is true, but he does it in a very awkward manner, wading into the shallows like a heron, and snatching suddenly at any of the finny tribe that may be passing in his direction. The bald eagle is very accommodating in his appetite, and will eat almost anything. He is especially fond of lambs, and is more than suspected of aiding the death of many a sheep by the dexterous use of his beak and claws. The bald eagle is found throughout the whole of North America, and may be seen hunting the greater part of the sea-coasts, as well as the mouths of the large rivers.

The Golden Eagle is found in most parts of Europe, and is not uncommon in Great Britain, especially in the mountainous parts of Scotland and the Hebrides. The flight of this magnificent bird is peculiarly beautiful and imposing, but its gait when on land is rather awkward; for its long talons encumber it in the same manner that the sloth and great ant-eater are impeded by their long curved claws, when they attempt to walk with any rapidity.

Its food is usually sea-birds and the smaller quadrupeds, such as hares, rabbits, etc.; but it does not hesitate to carry off young lambs, or sometimes to destroy a sickly sheep. Some instances have been related of children that have been carried away by this eagle, but they are very doubtful. Eagles certainly have pounced upon children, and carried them a little way; but there are no authenticated accounts of children having been actually taken to the eagle's nest, although there are many pretty stories founded on such a supposition.

It generally hunts in pairs, one eagle watching from some height while the



EAGLE FISHING.

other courses along the ground, and drives the game from the bushes. The male and female remain together all the year, and very probably for life. It lays two eggs of a yellowish white color with pale brownish spots, on a nest composed of a great mass of sticks, rushes, and grass, and the young are fledged about the end of July. While the young are in the nest, it is very dangerous to approach the spot, as the eagles are then extremely fierce and daring. The eye of this bird, and of most of the birds of prey, is provided with an arrangement for enabling it to see an object near or at a great distance. The old tale of the eagle delighting to gaze at the sun is equally poetical and false, the true fact being that the eye is shaded from the sun by the projecting eyebrow. As to the nictitating membrane, which some assert to be given to the eagle in order to enable it to gaze at the sun, all birds have it, and the owl, who is blinded by ordinary daylight, possesses it in perfection.

THE BUZZARD.—The family of the Buzzards are distinguished by their short beaks, large rounded wings, and squared tails. They all live on small animals, reptiles, and various insects.

The Common Buzzard occurs throughout most of Europe and part of Asia and America. When searching for food, it rests upon some high branch, keeping a keen watch on the ground, and waiting patiently until some small animal, such as a rat or young rabbit, makes its appearance, when it instantly sweeps down from its elevation, seizes its prey without settling on the ground, and returns, if not disturbed, to the same spot, very much in the same manner that the fly-catcher may be observed to act. It generally builds in high trees, but has been known to make its nest among rocks. Its eggs are usually three in number, of a whitish color, spotted with pale brown, and almost devoid of the peculiar red tinge that generally characterizes the eggs of the diurnal birds of prey. The length of this bird is from twenty to twenty-two inches; the fourth primary feather is the longest.

THE KITE, GLEDGE, OR GLED, is not uncommon in America and is spread over Europe, Asia, and Northern Africa. It is especially hated by the farmer for its depredations on his poultry, and its appearance is the signal for a general outcry among the terrified poultry, who perceive it long before the keenest-eyed man can distinguish it from a casual spot in the distant sky. The sportsman also detests it for the havoc which it makes among the game—possibly the kite hates the sportsman for the same reason. It builds in tall trees, and lays three eggs, white, spotted with reddish brown at the larger end. Its length is rather more than two feet; the fourth primary feather is the longest, the first and seventh nearly equal.

FALCONS.—In the genus *Falco*, the second primary feather is the longest, the first and third being of equal length. The Peregrine Falcon, an inhabitant of most parts of Europe, Asia, and South America, was in the palmy days of hawking one of the favorite falcons chosen for that sport. Its strength and swiftness are very great, enabling it to strike down its prey with great ease; indeed, it has been

known to disable five partridges in succession. From its successful pursuit of ducks the Americans call it the Duck Hawk.



PEREGRINE FALCON.—*Falco peregrinus*.

There is a peculiarity in the method of attack which this bird employs when pursuing small game. Instead of merely dashing at its prey, and grasping it with its claws, the peregrine falcon strikes its victim with its breast, and actually stuns it with the violence of the blow before seizing it with its claws. The boldness of the peregrine falcon is so great that it was generally employed to take the formidable heron. After the heron had been roused from his contemplations by some marsh or river, the falcon, who had previously been held hooded on its master's hand, was loosed from its bonds and cast off. A contest then generally took place between the heron and the falcon, each striving to ascend above the other. In this contest the falcon was always victorious, and after it had attained a sufficient altitude, it swept, or "stooped," as the phrase was, upon the heron. When the falcon had closed with its prey, they both came to the ground together, and the sportsman's business was to reach the place of conflict as soon as possible, and assist the falcon in vanquishing its prey. Sometimes, however, the wary

heron contrived to receive its enemy on the point of its sharp beak, and transfixed it by its own impetus.

It changes the color of its plumage several times before it arrives at full maturity, and in the days of falconry was known by different names, such as "haggard" when wild, "eyeass," "red falcon" when young, "tiercel" or "tassel-gentle" when

a full-grown male; a term forcibly recalling the words of Juliet, "Oh for a falconer's voice, to lure this *tassel-gentle* back again!" It builds on ledges of rocks, laying four eggs of a reddish brown color. Its length is from fifteen to eighteen inches.

The KESTREL frequently falls a victim to the mistaken zeal of the farmer, who takes every opportunity of destroying it, as he confounds it with the sparrow-hawk. The natural food of the kestrel is field-mice, so that the farmer should protect instead of remorselessly murdering his benefactor. These birds are not uncommon. Their nest is usually built in the deserted mansion of a crow or magpie. The eggs are four in number, of a dark reddish brown. The length is from thirteen to fifteen inches.

The SPARROW-HAWK is an inhabitant of many portions of the world and displays great pertinacity in pursuit of its prey, which it will chase for a long while, skimming along a few feet above the ground. One of these hawks was known to dash through a window in pursuit of a small bird. When taken young it is easily tamed, and will then associate with the most incongruous companions. A gentleman had a young sparrow-hawk which used to live in his dovecot among his pigeons, would accompany them in their flights, and was uneasy if separated from his strange friends.

Although a brave little bird in its wild state, it sometimes becomes sadly degenerate when domesticated. I had a tame sparrow-hawk, which was purchased for the ostensible purpose of



SPARROW-HAWK.—*Accipiter Nisus*.

frightening birds from the vegetables in the garden. But unfortunately his presence was rather an attraction than otherwise, for besides the pleasing excitement caused by mobbing him, he was invaluable to the tomtits, who always ate his meat if he were not protected by some human being. He would fly in terror before the wagtails, and the tomtits regularly charged at him when he was fed, and then made a dash at his saucer of provisions. But all tame sparrow-hawks are not so demoralized. I know one of these birds which, although young, is the acknowledged master of an establishment consisting of three dogs and a cat. He flies at the dogs if they approach too near his throne, and sometimes dashes at them without any apparent reason. The length of this bird is from twelve to fifteen inches. The fourth and fifth primary feathers are the longest. It builds upon lofty trees, laying five eggs, of a whitish color blotched with variable reddish brown markings, usually collected toward the large end, and often forming a deep reddish irregular band.

The SECRETARY BIRD derives its name from the tufts of feathers at the back of its head, which bear a fanciful resemblance to pens stuck behind the ear. This extraordinary bird, whose true position in ornithology has been such a stumbling-block to naturalists, inhabits South Africa. It feeds on snakes and other reptiles, of which it consumes an amazing number, and is on that account protected. When battling with a snake, it covers itself with one wing as with a shield, and with the other strikes at the reptile until it falls senseless, when a powerful blow from the beak splits the snake's head asunder, and the vanquished enemy is speedily swallowed. In the crop of a secretary bird that was dissected by Le Vaillant were found eleven large lizards, three serpents, each a yard in length, eleven small tortoises, and a great quantity of locusts and other insects. Besides these, the bird had just overcome another serpent, which would in all probability have been transferred to the same receptacle had it not been killed. The secretary is easily tamed, and is exceedingly useful. It builds on high trees, laying three large eggs, almost white. Its length is about three feet.

OWLS.—A large round head, with enormous eyes looking forward, is a distinguishing mark of the owl family. Many species possess two feathery tufts placed on the head, greatly resembling horns. The owls are nocturnal birds, pursuing their prey by night, and sleeping during the day. In order to enable them to see their prey, their eyes are enormously large, and capable of taking in every ray of light. The power of vision is also increased by the method in which the eye is fixed in a kind of bony socket, just like a watchmaker's glass. The nictitating membrane is very conspicuous in these birds. The power of hearing is also very delicate, and greatly assists them. In order to protect them from the cold, they are furnished with a dense covering of downy feathers, which also prevents the movements of the wing from being heard by the wary mouse; and so noiseless is their flight that they seem to be borne along by the wind like a tuft of thistle-down.

The Barn Owl affords another instance of mistaken persecution. This beautiful and most useful bird, whose carcass we so often see triumphantly nailed to the barn, actually feeds upon and destroys in incalculable numbers the rats and mice which bear it company in its undeserved punishment. Few people know what a little bird this owl really is. The thick loose plumage is so deceptive, that no one unacquainted with the structure of the bird would imagine that it is hardly so large as a pigeon. The head, too, when deprived of its feathery covering, completely loses its previous aspect, being long and narrow, like that of a hawk. In fact, few creatures look more contemptible than an owl stripped of its feathers. The domestic habits of the bird are very curious. When irritated or alarmed, it has a habit of snapping its beak loudly, and making a hissing sound, something like that of a cat when very much provoked. Indeed there is something very cat-like in the whole aspect of the owl. Its round, soft-looking face, in which are set two great eyes that shine in the dusk of the evening with an almost phosphoric gleam, and are capable of taking in every feeble ray of light, its noiseless movements in pursuit of its prey, all strongly remind the observer of the feline character.

The plumage of this bird is very thick, in order to defend it from the cold night air, and very soft, in order to admit of its flight with such silence that even the thick and wary ear of the timid field-mouse may not perceive the approach of its enemy. This noiselessness is caused by the formation of the feathers, which instead of being stiff and smooth, like those of the diurnal birds of prey, are loose and furnished at their extremities with a delicate fringe, which completely prevents that rushing sound which accompanies the flight of the eagle or hawk. Its method of devouring a mouse is quite different from the mode in which it eats a bird. If a mouse is given to an owl, the bird seizes it across the back, and gives it one or two smart bites, much as a terrier handles a rat. The mouse is then jerked upward and caught again head downward. A second jerk sends the mouse half down the owl's throat, while its tail remains sticking out of the side of its bill, where it is rolled about as if the owl were smoking. After some time has been spent in this amusement, another jerk causes the mouse to disappear altogether, and the owl looks very happy and contented. But if a small bird is presented to it, the owl tears it up and devours it piecemeal.

The Virginian Eared Owl is found spread over the greater portion of North America, and in former days did great damage among the poultry of the agriculturists, being as bold as well as a voracious bird. Now, however, the ever-ready rifle of the farmer has thinned its number greatly, and has inspired the survivors with such awe, that they mostly keep clear of cultivated lands, and confine themselves to seeking after their legitimate prey.

It is a terrible destroyer of game, snatching up grouse, partridges, hares, ducks, sparrows, squirrels, and many other furred and feathered creatures, and not unfrequently striving after larger quarry. The wild turkey is a favorite article of diet with

this owl; but on account of the extreme wariness of the turkey nature, the depredator finds an unseen approach to be no easy matter. The usual mode in which



VIRGINIAN EARED OWL.—*Bubo Virginianus*.

the owl catches the turkey is to find out a spot where its intended prey is quietly sleeping at night, and then to swoop down suddenly upon the slumbering bird before it wakes. Sometimes, however, the owl is baffled in a very curious manner. When the turkey happens to be roused by the rush of the winged foe, it instinctively ducks its head and spreads its tail flatly over its back. The owl impinging upon the slippery plane of stiff tail-feathers, finds no hold for its claws, and glides off the back of its intended victim, which immediately dives into the brushwood before the owl can recover from the surprise of its unexpected failure.

The flight of this bird is remarkably powerful, easy, and graceful, as may be gathered from the enormous expanse of wing in comparison with the weight and dimensions of the body. Its voice is of a hollow and weird-like character, and when heard by night from some spot on which the owl has silently settled, is apt to cause many a manly cheek to pale. As Wilson well observes, the loud and sudden cry of "Waugh O! Waugh O!" is sufficient to alarm a whole garrison of soldiers.

Probably on account of the peculiar sounds which are uttered by this bird, the Creek Indians know it by the name of *Otowuck-oho!*

The Virginia Horned Owl takes up its residence in the deep swampy forests, where it remains hidden during the day, and comes out at night and morning, heralding its approach with its loud, unearthly cries, as if an unquiet wandering spirit. Sometimes, according to Wilson, "he has other nocturnal solos, one of which very strikingly resembles the half-suppressed screams of a person suffocating or throttled."

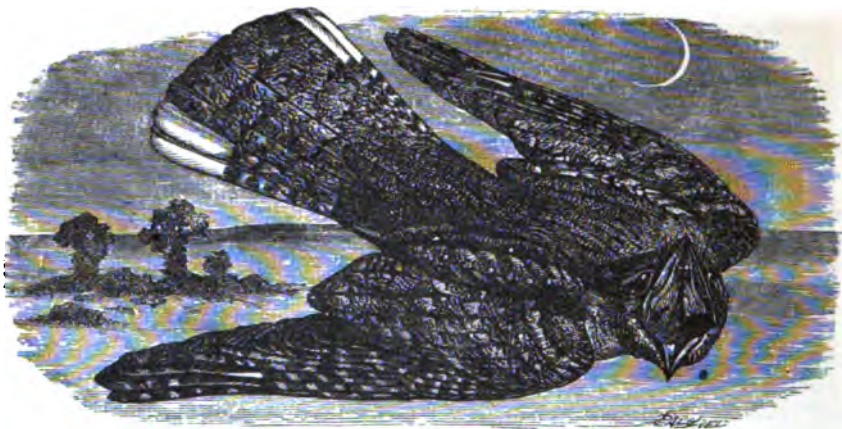
The nest of this bird is extremely large, and consists of a large bundle of sticks, grass, leaves, and feathers, placed in the fork of some large bough, and containing three or four white eggs. The color of the Virginian eared owl is reddish brown upon the upper surface, mottled with various splashes of black, and covered with regular bands of the same hue. The facial disc is brown, edged with black. The under surface is of a light reddish brown color, covered with numerous transverse bars of dusky brown, with a few white lines and dashes among them. The throat is pure white, the beak and claws are black, and the eyes are of a bright orange, gleaming out strangely even by day, and burning with double radiance in the twilight.

The Accipitres, it will be remembered, possess strong hooked beaks and sharp curved claws. The foot and head of the Passeres are entirely different—the beak being without the formidable curved tip, and the claws being of a quiet and peaceful character. The first tribe of this order, the Fissirostres, are so called from the peculiar formation of their mouths, which appear as if they had been slit up from their ordinary termination to beyond the eyes, much resembling the mouth of a frog. In the insect-eating Fissirostres this formation is admirably adapted for capturing their active prey, and in the Kingfishers it is equally useful for securing the slippery inhabitants of the waters.

The Caprimulgidæ are nocturnal in their habits, chasing their insect prey by night or at the dusk, when the chaffers and large moths are on the wing. In order to prevent the escape of the insect when taken, the mouth is fringed with long stiff bristles, called “vibrissæ.” The name of Goat-sucker is derived from a silly notion that they suck goats, a piece of credulity only equalled by the hedgehog's supposed crime of sucking cows, and the accusation against the cat of sucking the breath of children. The genus *Caprimulgus* is furnished with a kind of comb on the middle claw of its foot, but for what purpose is not clearly ascertained. The power of wing in these birds is very great, and hardly surpassed by that of the swallow, both birds obtaining their food in a similar manner.

The Night-Jar, or Goat-sucker, sometimes called the Fern Owl, is spread over Europe, and is quite common in England.* It may be seen at the approach of evening, silently wheeling around the trees, capturing the nocturnal moths and beetles; then occasionally settling and uttering its jarring cry. When flying, the bird sometimes makes its wings meet over its back, and brings them together with a smart snap. It arrives in this country at the beginning of May, and leaves in December. It makes no nest, but lays two mottled eggs on the bare ground. Its length is ten inches. The Whip-poor-Will and the Chuck-Will's-Widow both belong to this family.

* I have seen it near Amiens, accompanying a train, and apparently hawking after the moths that were attracted by the lights.

EUROPEAN GOAT-SUCKER—*Caprimulgus Europæus*.

SWALLOWS.—The Hirundinidæ are remarkable for their great power of wing, their wide mouths, and short legs. In the genus *Cypselus*, the toes are all directed forward, and the tarsus is thickly feathered. The whole of their plumage is constructed with a view to rapid and active motions. The feathers of their bodies are firm and close, so as not to impede their passage through the air; their wing feathers are long, stiff, and pointed, and their tails are long and forked; all which properties we know to belong to great speed.

The Common Swift, popularly called "Jack Screamer," is the largest and swiftest of the Hirundinidæ. It seems to spend the whole day on the wing, wheeling with wonderful velocity, and occasionally soaring until it is hardly perceptible, but screaming so shrilly, that the sound is plainly heard. The number of insects which it destroys is almost incredible; they are retained in a kind of pouch under the tongue, and when taken out, can hardly be pressed into a teaspoon. These are intended for the young, and the supply is constantly renewed. It lays from two to four long white eggs, on a nest composed of grass, straws, feathers, silk, etc. The color of this bird is a dusky black. The length is eight inches, the expanse of wing eighteen inches, and its weight barely *one ounce*. The foot of the swift is of a singular form, unlike that of any other bird. All the toes are directed forward, there being no hinder toe at all. Some naturalists say that the object of this formation is that the bird may be enabled to climb up the eaves under which its nest is made. If, however, that is the case, we may ask, Why is not the same shape of foot found in the sparrows and other birds, which build in precisely similar localities?

The Chimney Martin or Swallow is the most common of its family, and too

well known to need much description. When skimming over ponds or rivers in search of insects, the snap with which it closes its bill may easily be heard. In the course of its flight over the surface, it often dashes up the water with its wings, which action gave rise to the opinion that swallows passed the winter under water, and rose in the spring. It is so eager after its prey, that it may be easily caught with a rod and line baited with a fly, after the manner of anglers.

When I was at school, we used to knock down plenty of swallows with stones in the following manner: We went to a bridge, or some such place, where many swallows were flying about. Where they appeared in the greatest numbers we threw a small white stone, and immediately hurled a larger one after it. The swallows all dashed at the little stone, taking it for some entomological luxury, and one or two were generally struck down by the big stone following in its wake. It breeds twice in the year, building a nest of mud against a wall or other convenient situation, and laying five very pale pink eggs, spotted with reddish brown, the pink of which vanishes when the egg is emptied of its contents, as it is caused by the light passing through the yolk, and has to be renewed by artificial means if the eggs is placed in a collection. Such is also the case with most small light-colored eggs. The bird appears regularly to return, year by year, to its old nest. The whole of its upper surface is a deep purplish black, its forehead and throat chestnut. Humboldt, in his "Travels," relates that he saw a swallow perch on the

rigging of the vessel when it was one hundred and twenty miles from the land.

The Sand Martin is the smallest of our American swallows, but makes its appearance before any of its brethren. It principally builds in cliffs of sandstone, boring holes three feet or more in depth, and often winding in their course, most probably to avoid a casual stone or spot too hard for its bill, which, although small and apparently unfitted for the task, makes its way through the sandstone with extraordinary rapidity. Where a convenient sand-cliff exists, hun-



HOUSE MARTIN.—*Chelidon urbica*.

dreds of these pretty little birds may be seen working away at their habitations, or dashing about in the air, looking at a distance like white butterflies, and occasionally returning to the rock, which is often completely honeycombed by their labors.

The House Martin reaches the States a little after the swallow, and almost invariably takes possession of its old nest, which it repairs about May. It lays five eggs closely resembling those of the sand martin. About September, immense numbers may be seen perched upon houses and trees preparatory to their departure, at which time every available point is covered with them.

The Esculent Swallow, whose nests are considered such a delicacy among the Chinese, builds its singular habitation in the sides of almost inaccessible cliffs, so that the business of procuring them is a most dangerous task.

The nests are harried about three times in every year, and it is said that the natives who are employed in procuring them are careful to destroy the old and deep-colored nests, in order to force the birds to build new habitations, which command a high price in the market. The construction of a single nest is a work of considerable time, occupying nearly two months, and the structure of these wonderful habitations shows that the bird forms them by procuring out of its mouth a viscid secretion, which hardens into adhesive threads as it comes in contact with the air. A close examination of the nest shows that it is composed of a great many layers of irregular net-work, the meshes of which connect them in every direction. The nests are chiefly found in Java.

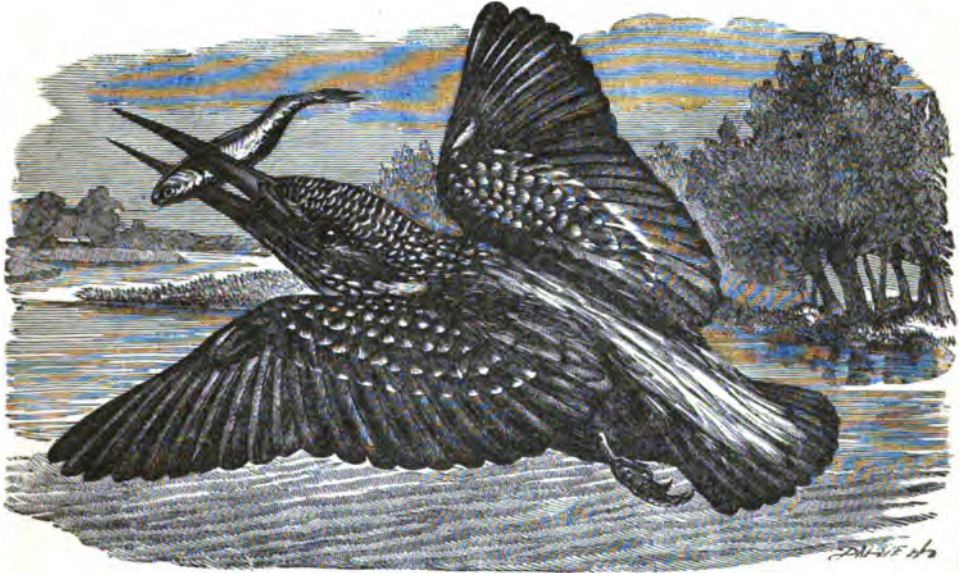
The TROGON.—The magnificent family of the trogons stands pre-eminent in beauty and brilliancy of plumage, the usual tint being a metallic golden green, boldly contrasted with scarlet, black, and brown. The toes are placed two behind and two before, like those of the woodpeckers.

The Resplendent Trogon is the most gorgeous of all this gorgeous family. Its long and gracefully curved tail, nearly three feet long, the whole of the upper surface, and the throat, are a glowing green; the breast and underparts are bright crimson; the middle feathers of the tail black, and the outer feathers white. This splendid bird is an inhabitant of Mexico, and was used by the Mexican nobles as an ornament to their head-dress.

From the feathers of these and other trogons the mosaic pictures of the Mexicans were made. One of these, most delicately and beautifully executed, containing many figures, is now in the Ashmolean Museum at Oxford, and is there said to be made of humming-birds' feathers. The subject is "Christ fainting under the cross." The whole picture is about the size of the palm of the hand, and the figures are barely half an inch in height. This is a very difficult bird to stuff, on account of the delicate texture of the skin, which is so fragile that it tears almost as easily as wet blotting-paper.

The KINGFISHER.—The peculiarities of their form immediately distinguish the kingfishers from other birds. The disproportionate length of the bill is their chief characteristic. The common kingfisher is found in most parts of England and America. Scarcely anything more beautiful can be conceived than the metallic glitter of its plumage as it shoots along the banks of the river, or darts into the water after its struggling prey. Its usual method of fishing is by placing itself on a

stump or stone overhanging the water, from which spot it watches for the unsuspecting fish beneath. After a fish is caught, the bird kills it by beating it several times against its resting-place, and then swallowing it, head foremost. Sometimes it does not exercise sufficient caution in its devouring propensities. A heedless



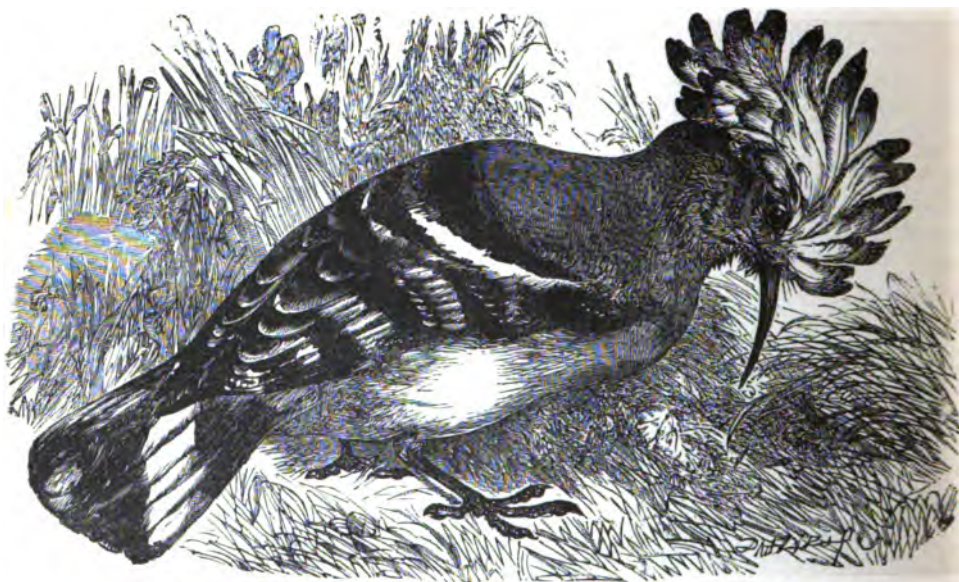
KINGFISHER.—*Alcedo hispidula*.

kingfisher was exhibited by the Zoological Society, which had been found dead with a peculiarly large minnow firmly fixed in its throat.

It lays its eggs in holes bored in the banks of rivers or ponds, and appears to build no nest. A pair of kingfishers, for two successive years, inhabited a bank of a very small stream, little more than a drain, at Little Hinton, Wiltshire, where no fish lived, nor were there any to be found within a considerable distance. The eggs are from four to seven in number, of a pearly whiteness, and remarkably globular in shape.

The HOPOE, one of the most elegant birds that visit this country, is unfortunately a very rare guest, and seldom, if ever, breeds here. Its beautiful crest can be raised or depressed at pleasure, but is seldom displayed unless the bird is excited from some cause. Its food consists of insects, which it first batters and moulds into an oblong mass, and then swallows, with a peculiar jerk of the head. In Yarrell's "British Birds," there is a very interesting account of a tame hoopoe in the possession of Mr. Bartlett.

In France, hoopoes are very common, and may be seen examining old and rotten stumps for the insects that invariably congregate in such places. There they may be seen in flocks, but they never seem to come over to England in greater numbers than one pair at a time. M. Bechstein gives a curious account of the at-



HOPOE.—*Upupa epops*.

titude assumed by the hoopoe on perceiving a large bird in the air. "As soon as they perceived a raven, or even a pigeon, they were on their bellies in the twinkling of an eye, their wings stretched out by the side of the head, so that the large quill feathers touched the head, leaning on the back with the bill pointing upward. In this curious posture they might be taken for an old rag!" The hoopoe lays from four to seven gray eggs in the hollow of a tree. Its length is one foot.

THE HUMMING-BIRD.—These little living gems are exclusively found in America, especially about the tropical parts, becoming gradually scarcer as we recede from the tropics in either direction. Only two species are known to exist in the northern parts, but in the central portions and in the islands about Florida they absolutely swarm. They glance about in the sunshine, looking like streaks of brilliant light; and so rapid is the vibration of their fine and elastic wings that, when hovering over a flower, a humming or buzzing sound is produced, from



GROUP OF HUMMING-BIRDS.—*Trochilus Polytmus*.

RUBY-THROATED HUMMING-BIRD.

THE CORA HUMMING-BIRD.

GOULD'S HUMMING-BIRD.

THE BAR-TAILED HUMMING-BIRD.

THE DOUBLE-CRESTED HUMMING-BIRD.

which peculiarity the name of humming-bird has been given them in almost every language. Waterton's description of the appearance of the humming-bird in the sun is very characteristic: "Though least in size, the glittering mantle of the humming-bird entitles it to the first place in the list of the birds of the New World. It may truly be called the Bird of Paradise; and had it existed in the Old World, it would have claimed the title instead of the bird which has now the honor to bear it. See it darting through the air almost as quick as thought! Now it is within a yard of your face—in an instant gone—now it flutters from flower to flower to sip the silver dew—it is now a ruby—now a topaz—now an emerald—now all burnished gold." The tongue of the humming-bird is formed much like that of the woodpecker, being curled round the head, under the skin, and thus capable of being darted to a considerable distance.

Like many other little creatures, the humming-bird is remarkable for its assurance and impudence. It is easily tamed for that very reason, and has been known to domesticate itself in an hour from the time of its capture, and even when released, it has returned again to partake of the dainties which it had tasted during its captivity. There are an immense number of species of these ex-

quisite birds varying from the size of a swift to that of a humble bee. The nests are very neat and beautiful, and as may be imagined from the diminutive size of the little architect exceedingly small. They are composed of down, cotton, etc., and are sometimes covered on the outside with mosses and lichens.

The CREEPERS are remarkable for their long, slender bills and claws adapted for climbing trees and capturing insects. The common creeper may often be seen in this country, running spirally up the trunks of trees, and probing the bark with its bill; and so firmly do the claws hold, that, when shot, it does not always fall, but remains clinging to the tree. The nest of this elegant little bird is made in a decayed tree. The eggs are from seven to nine in number, gray, with dusky spots.



WREN.—*Trogodytes vulgaris*.

The WREN shares with the robin some immunity from juvenile sportsmen. Although it may be fearlessly hopping about in the hedge, jerking its funny little tail, and playing its antics just at the

muzzle of the gun, few boys will fire at it—a privilege for which it is difficult to give a reason, except, perhaps, the very incomprehensible assertion that “the robin and the wren have divine protection,” although why these two birds, both proverbially quarrelsome and pugnacious, should be selected, to the exclusion of others, is difficult to say. Perhaps the robin enjoys his immunity from the “Babes in the Wood,” and the wren makes a convenient rhyme. Be this as it may, it is to be wished that a similar rhyme existed, including the owl and the kestrel.

The nest of the wren is built in any convenient cranny; an ivy-covered tree, the thatch of a barn, or a warm scarecrow, are all used by this fearless little bird. The nest is usually of an oven-like shape, always covered on the outside with some material resembling the color of the objects round it, such as green moss if built among ivy, or brown lichen if built on a rock or in the fork of a withered branch. The eggs are six or eight in number—white, speckled with reddish brown.

The NIGHTINGALE.—

“Tiuu tiuu tiuu tiuu—Spe tiuu zqua—
 Tiö tiö tiö tio tio tio tio tix—Qutio qutio qutio qutio—
 Zquo zquo squo squo—Tzû tzû tzû tzû tuû tzû tzû tzû tzi—
 Quorror tiu zqua pipiquisi—Zozozozozozozozozozozozo zirrhading!” etc., etc.

So does a well-known naturalist endeavor to express the wild and spiritual melody of this most exquisite of British song-birds, the nightingale. And in truth it is perhaps as good a description as can be given without the aid of music. Even its own marvellous notes sound comparatively weak unless backed by the accompaniments of night and tranquillity; for the inimitable song of this Mendelssohn among birds loses great part of its beauty when uttered by day, deadened and confused with other sounds. There are some people who cannot appreciate the song of this bird. There is a story that a man who was engaged as gardener in a gentleman's family was permitted to live within the grounds. In a short time he asked to be allowed to change his house, and on being asked his reason for giving up so good a situation, answered that he could get no sleep at night, because those nasty nightingales kept up such a continual guggling.

In some counties of England it is never found, but in many its nightly strains are frequently heard. The fields and college gardens near London are full of nightingales, whose songs add greatly to the effect of the scene. Well may Isaak Walton say in his delightfully quaint language:

“But the nightingale, another of my airy creatures, breathes such sweet, loud music out of her instrumental throat, that it might make mankind to think that miracles are not ceased. He that at midnight, when the very laborer sleeps securely, should hear, as I have very often, the clear airs, the sweet descents, the natural rising and falling, the doubling and redoubling of her voice, might well be lifted above earth, and say, ‘*Lord, what music hast thou provided for the saints in heaven, when thou affordest bad men such music on earth?*’” It must be borne in

mind that not only in this bird, but in other singing-birds, the male is the vocalist, so that Milton's address to the "sweet songstress" is unfortunately not quite so correct as poetical ; a misfortune of frequent occurrence.

The WARBLERS are spread over almost the entire globe, and many gladden this country with their pleasant songs. The BLACKCAP, almost a rival to the nightingale, is at once recognized by the black color of the crown of the head. Only the males, however, are thus decorated, the crown of the head of the female being dark brown. Its sweet notes are poured forth from the concealment of some thicket or tuft of trees, where it trusts to the density of the foliage to elude discovery. Like the mocking-bird of America, it can imitate the songs of other birds with such perfect inflection that it is almost impossible to detect the imposture. Among bushes and brambles it builds its nest, which is made of dried grass, moss, and hairs. The eggs are five in number—reddish brown, marked with dark spots. The length of the bird is nearly six inches; the third primary feather is the longest.

The GOLDEN-CRESTED REGULUS, as it ought properly to be called, is one of the smallest of birds. Fir plantations are its favorite resort, and there it may be seen hopping about the branches, or running round them, head downward, in search of the insects hidden beneath the bark. Its name is derived from the orange-colored tuft of feathers on the crown of its head, for which reason it is often called the Kinglet. Its note is weak, but very pleasing, and much resembles that of the common wren. The female is very bold while sitting, and will permit close observation without quitting the nest. The nest itself is an object of great beauty. It is usually placed on the under side of a fir branch, sheltered by the overhanging foliage, and sometimes further protected by a large bunch of cones forming a kind of roof over it. The eggs are from six to ten in number, very small, and of a reddish white color. The length of the bird is three inches and a half. The fourth or fifth primary feather is the longest.

The REDBREAST, or ROBIN REDBREAST, as it is affectionately termed, has, by its fearless conduct, earned itself golden opinions from all kinds of men. Every nation seems to protect it. Even the American redbreast lives unharmed, possibly on account of its connection with its English relation, whose oft-told charity toward the Babes in the Wood has turned aside from its posterity even the unsparing hand of the sporting schoolboy.

In the winter, when the berries are gone, insects dead, and the worms hidden under the hard frozen soil, then the robin flies for refuge to the habitations of man for shelter and food. It is very amusing to see the half-trusting, half-fearful look with which it hops to the window-sill for the first time. After a while, it becomes bold, and taps at the window, if the expected crumbs are not thrown out. Before very long, it ventures to enter the room, hops about on the table, and quite seems to consider as a right what was first merely a favor. When once estab-

lished, it is very jealous, and will not suffer a friend to be a partaker of the same comforts, but attacks him with the greatest fury ; so the unfortunate second comer has to wait shivering outside the window, with his feathers puffed up, and his little bright eye glancing from the depths of his plumage.

About the year 1873, a robin used to frequent our house. He was so tame as to answer to his name "Bob," and continue his attachments even through the summer. When the rabbits were fed, Bob always came to assist, and usually contrived to perch on the edge of the pan from which the rabbits were eating. Both parties seemed perfectly satisfied, and Bunny and Bob always continued very good friends. The nest of this bird is built in a crevice of an old ivied wall, in a bank, sheltered by the roots of trees, or in a mass of ivy clinging to an old tree. The eggs are five in number, of a pale gray color, profusely marked with reddish spots.

The TITS.—The birds of the family of the tits are remarkable for their active habits among the branches of trees. There are few who have not seen these beautiful and interesting little birds twisting round the branches, perfectly unconcerned at the presence of the spectator, sometimes hanging head downward, sometimes chasing an unlucky beetle along the bark, and invariably catching it, in spite of its swift limbs and active wings ; sometimes twisting off a bud, and pulling it to pieces with marvellous rapidity, in order to secure the lurking caterpillar within ; sometimes pecking away at a piece of loose bark, and extracting an unwilling spider by one of its legs left incautiously projecting from its lurking-place. Pity it is that their funny little sharp beaks should ever be put to worse uses ; but they lie under a grave imputation of using these very beaks in the slaughter of the defenceless young of other birds.

The little BLUE TITMOUSE is so well known as hardly to require any description. It is most amusingly courageous, and from the strenuous resistance it offers to its



BLUE TITMOUSE.—*Parus caeruleus*.

capturer, has acquired from rustic boys the name of "Billy-biter." The angry hiss of the female has frequently caused an intruding hand to be rapidly withdrawn, for the sound is so exceedingly like the hiss of an irritated snake, and the little beak is so sharp, that few have the courage to proceed with their investigations. A pair of these birds built their nest in the coping of the Great Western Railway, at the

Shrivenham station, not two feet from the fiery and noisy engines, which were constantly passing. The men respected the courage of the little birds, and this whole brood was hatched, and suffered to fly at liberty. The utter contempt which this bird entertains for fire-arms often leads to its destruction, for when the disappointed schoolboy has been wasting his powder and shot in attempting to hit larks and such large game, he consoles himself by shooting the unfortunate titmouse, who will allow him to come so close that few vestiges of it remain except a tuft of blue feathers. The eggs of the blue titmouse are from six to eight in number—white, marked with reddish brown spots. Its length is about four inches and a half.

The PIED WAGTAIL.—The wagtails, so named, from the almost incessant vibration of their tails, are exclusively confined to the Old World. The pied wagtail is the most common of its race. We often see it pass rapidly, with peculiar dipping flight; it settles on the ground and wags its tail; it runs a few paces, and wags its tail again; pecks at an insect, and its tail again vibrates. It does not hop, like the warblers, finches, etc., but runs with great rapidity, and altogether looks very like a diminutive magpie. Sand-banks by the sides of rivers are the usual resort of these birds, where they may almost always be seen, running about by the water's edge, sometimes snatching at an incautious may-fly, sometimes wading into the water after a caddis-worm or a stray grub, or pecking at an unfortunate little minnow, which has come too near the surface—and then it flies off to another spot to repeat the same manœuvres. This bird also greatly frequents pastures, and may be seen running about among the cows in the most nonchalant manner imaginable, catching the flies that torment those animals in the summer, or flying off to its unfinished nest with a beak full of hairs. Their nests are built near the water, in crevices among stones, or in the hole of a wall. Frequently when stones are piled by a wet quarry, several nests may be found in one heap of stones. The eggs are four or five in number, of a dusky white color, spotted with ashy brown. The length of the bird is seven inches and a half.

The WATER OUZEL, or DIPPER, is one of the most interesting of our native birds. It is found principally in hilly places where there are clear and rapid streams. There it may be seen to go through its far-famed movements under the water, which have given rise to so much controversy. It dives for considerable distances with apparent ease, and has a habit of dipping and rising repeatedly, from which practice its name has been derived. The nest is usually built by the water-side, and is most carefully concealed. In general appearance it is not unlike that of the wren, being made of intertwined mosses, with an entrance at the side. It lays five largish eggs, of a pure white. The length of this bird is about seven inches.

The SONG-THRUSH, THROSTLE, or MAVIS, is deservedly considered one of our best singing-birds. Its powerful and rich notes may be heard even during the month of January, when most of the other singing birds are either silent, or have

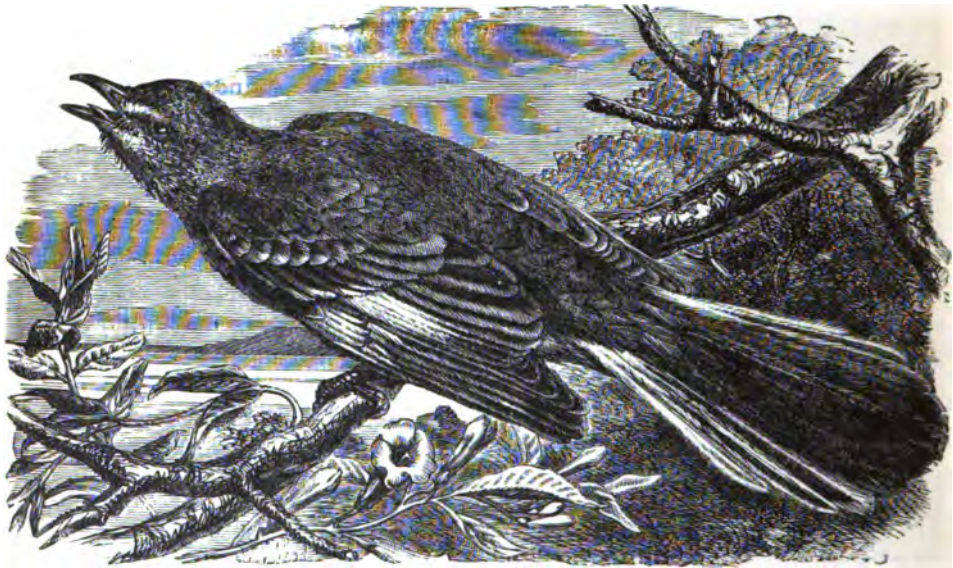
departed. Its nest is built almost before any other bird has commenced, and may often be seen conspicuously placed in a bush, some time before the leaves have begun to sprout. In order to defend the callow young from the cold winds of the season when they are hatched, the nest is more substantial than birds are accustomed to build, being thickly plastered within with a coating of mud, effectually keeping out the chilly blasts. Were it only for its singing powers, the thrush would deserve protection; but the services it renders to the gardener in devouring insects, snails, and other destructive creatures, entitle it to a double share of regard.

It is very amusing to watch a thrush listening for the sound of the earth-worm working his way through the ground, or the gnawing teeth of the cockchafer grub. The grub he unearths and devours without further ceremony, but he knows that if he is not cautious, the earth-worm will withdraw itself out of his reach. He therefore gives several hops near the worm, which, fancying that it hears its enemy the mole pursuing it, comes to the surface, and is instantly seized in triumph by the crafty thrush. It clears the shells from snails by beating them against a stone, and when it has found a convenient place for that purpose, it invariably returns to the same spot with its prey, so that heaps of broken snail-shells may often be found where the thrushes have been at work. The eggs of the thrush are five in number, of a bluish-green color, spotted with a deep reddish brown. Sometimes the spots are altogether absent.

The BLACKBIRD is another delightful songster, whose jetty hue and "orange-tawny bill" are too well known to need description. It is a very shy bird, and if disturbed in a hedge, has a habit of darting through it, and then escaping on the other side, uttering a sharp cry of alarm. The habits of this bird are not unlike those of the thrush, especially in its zeal for unearthing the cockchafer grubs, and possibly for eating cherries when they are ripe. Its nest is built usually at the foot of a hedge, frequently in the very centre of a holly bush, safe from most enemies, except weasels and schoolboys. The eggs are five in number, of a bluish-green color, profusely spotted with brown.

The MOCKING-BIRD, or POLYGLOT THRUSH, is a native of most parts of America. This wonderful bird stands pre-eminent in powers of song. Not only are its natural notes bold and spirited, but it has the faculty of imitating with deceptive fidelity every sound it hears. To its flexible organs, the harsh setting of a saw, the song of a nightingale, the creaking of a wheel, the whistled tune of a passer-by, the full and mellow notes of the thrush, the barking of a dog, the crowing of a cock, and the savage scream of the bald eagle, are each equally easy of execution, and follow one another with such marvellous rapidity that few can believe that the insignificant brown bird before them is the sole author of these varied sounds. The Virginian nightingale and the canary hear their exquisite modulations performed with such superior execution, that the vanquished songsters are silent for mere mortification, while the triumphant mocking-bird only redoubles his efforts. Wilson, whose ani-

mated description of this bird has never been surpassed, says: "His expanded wings and tail glistening with white, and the buoyant gayety of his action arresting the eye, as his song does most irresistibly the ear, he sweeps round with enthusiastic ecstasy, and mounts and descends as his song swells or dies away. He often



MOCKING-BIRD.—*Mimus polyglottus*.

deceives the sportsman, and sends him in search of birds that are not perhaps within miles of him, but whose notes he exactly imitates; even birds themselves are frequently imposed upon by this admirable mimic, and are decoyed by the fancied calls of their mates, or dive with precipitation into the depth of thickets at the scream of what they suppose to be the sparrow-hawk.

While sitting on its eggs it is an exceedingly courageous bird, attacking without discrimination man, dog, or any animal who may approach too near the nest. But the black snake is the special object of its vengeance. The snake, who has perhaps just arrived at the vicinity of the nest, and is contemplating a pleasant breakfast on the young or eggs, is violently attacked by the enraged mocking-bird, who, by repeated blows on the head, generally destroys its enemy, and then, mounting on a bush, pours forth a triumphant song of victory. The nest is made generally in a bush or apple-tree, frequently close to houses, as the bird is protected by the inhabitants. The mocking-bird is often kept tame, in which case, so far from

its imitative powers showing any decrease, the variety of domestic sounds heard about the house is often very perplexing.

The SPOTTED FLYCATCHER, an inhabitant of America, may be considered as the type of the entire family. It may be constantly seen in the gardens and orchards, going through the evolutions that have given it the names of Flycatcher, Post-bird, Beam-bird, etc. It takes its station on some elevated spot, such as the overhanging bough of a tree, a post, or a rail; and from thence watches for a passing insect, on seeing which, it darts from its post, secures the insect in the air, and returns to the spot by a short circular flight. It is not a timid bird, and will permit an observer to stand quite close to it, provided that he does not disturb it. Its note is a weak chirp, and even that is not often heard. The nest is built usually in holes of trees or walls, or sometimes between a branch of a wall-fruit tree and the wall itself. The eggs are five in number, spotted with reddish brown on a gray ground. The length of the bird is about five inches.

The SHRIKES, or BUTCHER BIRDS, well deserve their name, as they live upon insects and small birds, which they kill, and afterward transfix with a thorn, preparatory to devouring them. They take their prey much after the same manner as the flycatchers, by darting on it from some place of concealment.

The Great Gray Shrike is supposed to be only an occasional visitor to the States. It feeds upon mice, birds, frogs, and other small animals. After pouncing upon its prey, the shrike, by a few blows on the head from its powerful bill destroys it. The unfortunate animal is then carried to the nearest hedge, impaled, on a thorn, and the shrike devours it at his leisure. Large insects are treated in the same manner. The object of this impalement is apparently that the creature thus suspended should become tender or "high;" so that the modern epicure, who hangs up his venison until no one with an unsophisticated taste would venture to touch it, has but borrowed his custom from the shrike. The bird, after hanging a lizard or a mouse in this fashion, generally goes off and fetches another, always preferring to eat those which have remained longest on the thorn, and which are, as it were, cooked in the sun. There is a strong bodily resemblance between this shrike and the mocking-bird, the distinction lying generally in the outline; while the plumage is so similar, that many persons have actually confused the two birds giving to one the habits of the other. Moreover, the resemblance is not merely in outward form; the gray shrike can also imitate the notes of other birds, and often does so. The name Execubiter, or Sentinel, is given it from the habit of watching for birds of prey, and chattering loudly directly it perceives them, thereby proving that, like most other tyrants, it has a great objection to suffering any injury itself. The nest is built on trees, and contains about six eggs, grayish white, spotted with dark ash on the larger end; length of the bird is from nine to ten inches.

The JAY.—The CORVIDÆ are peculiarly remarkable for a kind of preternatural air of sagacity with which they set about any self-imposed task, especially if that

task be a mischievous one. The ravens and magpies are most conspicuous in these qualities. The jay, so well known for the beautiful blue markings on its wings, is rather a shy bird, preferring to reside in the thickest woods, and seldom coming into the open country. It is easily tamed when young, and is very amusing when domesticated. This bird possesses, like several others of the same family, considerable talents for mimicry. It has been known to imitate the sound of a saw, the bleat of a lamb, or even the neighing of a horse, with the most perfect accuracy. Nor do its powers cease here, for although its natural voice is harsh and grating, yet it can imitate the sweet notes of singing birds, such as a greenfinch, with wonderful fidelity. It has also frequently been taught to articulate words.

The name of *Glandarius* has been given to the jay, because it feeds on vegetable productions, such as acorns, etc., more than the true crows. It is also partial to fruits, especially ripe cherries, and is consequently persecuted by the gardener. It is also said to devour eggs and young birds. Its nest is built about twenty feet from the ground, the upper part of a thick bush being preferred. The eggs are five or six in number, of a yellowish white, thickly speckled with brown. The length of the bird is nearly fourteen inches.

The MAGPIE, who seems to rival the parrot in the proud title of the monkey of the birds (the raven being the ornithological baboon), is a well-known inhabitant of this country. Its thieving and hiding propensities have been frequently told; but I must still venture to give a few anecdotes of a tame magpie that resided in Wiltshire. This bird found a malicious enjoyment in pecking the unprotected ankles of little boys not yet arrived at manly habiliments, and was such a terror to the female servants that they were forced to pass his lurking-place armed with a broom. One of the servants having neglected this precaution, was actually found sitting down on the stones to protect her ankles, the magpie triumphantly pacing round her, until aid was brought, and the bird driven away. But to little boys and girls the magpie showed no mercy, springing out of its hiding-place and chasing them completely along the garden walk.

It had also a great penchant for tearing and biting to pieces any papers that came in its way, probably because it had perceived that people valued them. One Sunday morning, after the family had returned from church, the rector found his study strewn with pamphlets, torn newspapers, etc., so that until the delinquent was discovered, he really thought that thieves had been in the house. A magpie never seems to be happy unless it possesses a hiding-place, nor did this one form an exception to the general rule, as it had pecked a hole in the thatch of a barn, wherein to dispose of its ill-gotten goods, and displayed great uneasiness if anybody approached it. Another magpie gained entrance into the chapel of Wadham College, and remained quiet enough until the service had begun, when it gravely walked up the centre, bowing and saying, "Pretty Mag! Pretty Mag!" much to the discomposure of the junior members. A curious story is told respecting the

power of the magpie to count numbers. "George Le Roy states that a magpie having stolen some game, it was resolved to shoot it. A man hid himself in a

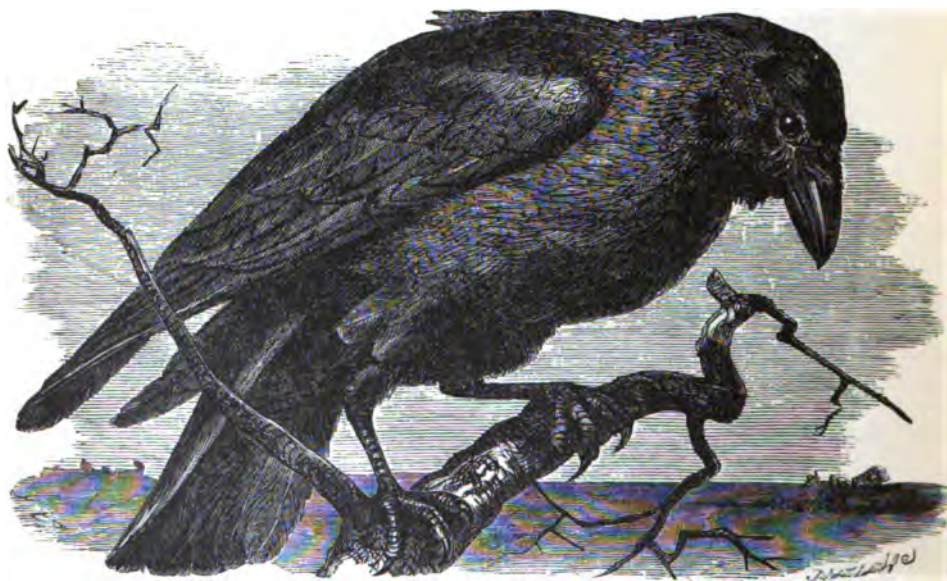


MAGPIE.—*Pica caudata*.

hut near its nest for this purpose. The bird flew away when he entered, nor would it return. The next day two men entered and one came out. Mag was not to be cheated; she waited till the second left also. Three went in and two came out,

with the same result. Four then entered, and three came away. The bird went back, and was shot. So magpies, says George Le Roy, can count three, but not four." The nest of the magpie is built on a high tree, and curiously defended with thorns, having a small hole just large enough to admit the owners, so that the liberal use of a pocket-knife is frequently requisite in order to obtain the eggs. The nest is covered with a dome of thorns, and its interior is defended by a coating of mud, worked smooth. The eggs are five in number, of a greenish white, covered with brown markings. The length of the bird is about eighteen inches.

The RAVEN is very common in parts of Europe, and some parts of Asia and America. It is more frequently found in the Hebrides than in any other part of Great Britain. In those islands it lives principally on carrion of various kinds,



RAVEN—*Corvus corax*.

such as a dead sheep or lamb, whose death the raven is accused with some justice of hastening, and on fishes or cetaceous animals which have been cast on shore by the waves. In these cases the raven conducts itself much in the manner of the vulture. It commences by taking out the eye and tongue, and then proceeds to tear open the abdomen, operations for which its sharp and powerful bill seems quite as well fitted as the hooked beak of that rapacious bird. It is a very crafty bird, and can with difficulty be approached; but by laying a dead carcass near its haunts, and be-

ing carefully concealed, it may be seen cautiously approaching: first, perching on an eminence, it looks carefully round; then advancing with a sidelong step, it examines its expected prey. When fully satisfied, it pecks out the eyes, and proceeds to satiate itself with food. The raven seems to revel in storms, and to be deterred by no inclemency of weather from seeking its prey.

Although formerly so plentiful in America that innumerable omens were drawn from its appearance, its croaking, or its flight, it has almost become extinct, much to the discomfiture of omen-seekers. No incantation and no dance of witches seemed to be considered complete without a black cat, a toad or two, a bat, and raven. Certainly the extraordinary gravity which marks the demeanor of the raven has something almost preternatural in it. The manner in which he sets about a piece of mischief, as if he considered it a moral duty, is most absurd, and the pertinacity with which he prosecutes a great work, such as the feat of Charles Dickens's raven, who "new pointed the greater part of the garden wall, by digging out the mortar, and tore up and swallowed in splinters the greater part of a wooden staircase of six steps and a landing," is perfectly astounding.

A raven in our possession used to watch the gardener taking particular pains to prop up and secure a valuable plant. His labor was always in vain, for the raven, with a sidelong step and an unconcerned air, as if he were thinking of anything but the plant, would sidle by it, when one wrench of his iron bill laid the unfortunate plant on the earth, and the raven moved off with a most provoking air of innocence. The lady to whom the garden belonged was quite afraid of the bird, and declared that she almost believed that it was possessed by some evil spirit. It used to walk behind her, so that she could never see it; for when she turned round, the raven hopped round too, and kept himself completely out of her sight. At last it became so very mischievous that it was sent away, much to my regret.

Not long ago, I was visiting a small collection of living birds, among which was a raven, whose wings were clipped, and who was permitted to have the free range of the yard. He gained considerable benefit from his freedom, for he could steal the provisions of the other birds, unless they were very quick. When I went to his residence, I took the back of a letter, and was reading the address, when I saw the raven watching my proceedings with great curiosity. The letter was of no consequence, so I let it fall, and walked on as if had been an accident. The raven waited until I had left the paper some few paces behind, when he took a sidelong kind of a walk toward it, tore it into scraps, and ran away with the largest piece under a water-butt, where he kept watch over it. It has a great capacity for imitating sounds, and can be taught to pronounce whole sentences, or sing songs with wonderful accuracy. In the northern parts of Scotland it makes its nest on high rocks, but not unfrequently builds on the summit of a tall tree. The nest is a large irregular structure of heath, grass, wool, and feathers, and sea-weed, if it builds near the sea-shore. It lays from four to seven eggs, of a pale green color,

spotted with greenish brown. The length of the bird is two feet two inches, and the expanse of wing four feet eight inches.

The Rook inhabits almost every part of Europe, and is very common in England, where it lives in a kind of semi-domestication, usually inhabiting a grove of trees near a house, or in a park, where it is protected by the owner, although he makes it pay for this accommodation by shooting the young ones every year. Apparently in consequence of this annual persecution, the rook has an intense horror of guns, perceiving them at a great distance. While feeding in flocks in the fields, or following the ploughman in his course, and devouring the worms and grubs turned up by the share, the rook has always a sentinel planted in a neighboring tree, who instantly gives the alarm at the sight of a gun, or other suspicious-looking object.

The good which the rook does by devouring the grubs of the cockchafer, and the tipulus, or daddy-long-legs, both of which are exceedingly injurious to the crops, more than compensates for the damage it sometimes causes by pulling up young corn, or newly set potato cuttings; in the latter case more, I believe, to get at the wireworms, which crowd to slices of potato, than to eat the vegetable itself. In the fruit season, the rook, like most other birds, likes to have his share of the cherries, pears, and walnuts, but may be easily kept away by the occasional sight of a gun. Toward evening, the rooks may be seen flying in long lines to their resting-place—"The blackening train of crows to their repose." They then perform sundry evolutions in the air, and finally settle to rest. Round the base of the rook's beak is a whitish-looking skin, denuded of feathers, the reason or cause of which is not very obvious. A white variety of the rook is sometimes seen. The gamekeeper at Ashdown had a very fine white rook, which he kept tame in his garden. The eggs of the bird are five in number, similar to those of the raven in color, but much smaller. The length of the bird is nineteen inches.

The JACKDAW is another well-known bird. It does not build in the branches of trees like the rook, to which it is very similar in many respects, but prefers holes in decayed trees or old buildings, particularly frequenting church towers and steeples. The jackdaw feeds upon almost any substance that it can find. It kills mice with a single blow of its beak, and then devours them piecemeal. Grasshoppers, beetles, etc., are also killed by a squeeze across the thorax, and the head, wings, and legs are twisted off before the bird begins to eat them. It treats bees, wasps, and other stinged insects with much more caution. The feathers upon the crown of its head are of a grayish white color, a peculiarity instantly distinguishing it from the rook. It is frequently kept tame and is very amusing in captivity. The eggs are of a lighter color than those of the rook, smaller and more sparingly spotted. The length of the bird is fourteen inches.

The CROW, or CARRION CROW, as it is erroneously called, seldom feeds on carrion; for poor indeed would be his meals were he dependent on dead sheep or

horses for a livelihood. Possibly the name was given as a distinction between it and the rook. Waterton states that the flesh of the carrion crow is just as good as that of the rook, and relates how he once served up a pie of these birds to some friends, who thought them pigeons. It will also eat cherries and walnuts like the rook, and when the supply of insects has failed, it will then turn its attention to the duck-pond and farm-yard, and carry off a young duckling or chicken. It also carries off eggs, by pouncing upon them, and driving its bill through the shell, and even mice and rats are not unaccustomed food. The nests of this bird are placed on the summit of some tall tree, and contain about five eggs, closely resembling those of the rook. The length of the bird is eighteen inches.

The CHOUGH is rather larger than the jackdaw, and is principally distinguished by the red hue of its bill and legs. It inhabits the counties of the western coast of England, and is perhaps more common in Cornwall than in any other county. When tame, it shows a very inquisitive disposition, examining every novelty with the greatest attention. It builds its nest in the cavities of high cliffs, and lays four or five eggs of a yellowish white color, spotted with light brown. The length of the bird is seventeen inches.

The EMERALD BIRD OF PARADISE.—This most gorgeous and elegant bird was once the subject of much discussion between naturalists. The natives of New Guinea were accustomed to dry them, having first cut off their legs, and then to offer them for sale. In this footless state they reached Europe, where it was universally stated that the bird lived always in the air, buoyed up by the lightness of its feathery covering; that the shoulders were used as its nest; that the only rest it took was by suspending itself from a branch by the filamentary feathers of the tail; that its food was the morning dew; together with many other conjectures not less ingenious than amusing. This bird is about the size of a jay. Its body, breast, and lower parts are of a deep rich brown; the front set close with black feathers shot with green; the throat is of a rich golden green; the head yellow; the sides of the tail are clothed with a splendid plume of long downy feathers, of a soft yellow color. By these are placed two long filamentous shafts, which extend nearly two feet in length.

Of these beautiful feathers the bird is so proud that it will not suffer the least speck of dirt to remain upon them, and it is constantly examining its plumage to see that there are no spots on it. When in its wild state, it always flies and sits with its face to the wind, lest its elegant filmy plumes should be disarranged.

The STARLINGS comprise many genera, among which the Pensile Orioles of America are the most interesting. These birds build, or rather weave, a fabric not unlike loose cloth, composed of hemp or flax. This nest is of the singular form represented in many engravings, and the entrance is at the side. In all probability this singular formation is for the purpose of keeping out the black snake, who is constantly on the look-out for young birds. The parent orioles often attack the

snake, and compel him to retreat. The plumage of the male when full grown is very brilliant. The head, throat, and back are black, the under parts are orange, the breast vermillion. A band of orange passes over the shoulders, and the tail is orange and black. The length of the bird is almost eight inches. This is not the only bird that constructs pensile nests; the Weaver Birds also form these nests, but of a different form. They look like great pistols hung up by the butt, the entrance being at the muzzle, and the nest in the butt.



COMMON STARLING.—*Sturnus vulgaris*.

The common starling is a bird well known both for its beauty and its singular method of flight. When a flock of starlings begin to settle for the night, they wheel round the place selected with great accuracy. Suddenly, as if by word of command, the whole flock turn their sides to the spectator, and with a great whirring of wings, the whole front and shape of the flock is altered. No body of soldiers could be better wheeled or countermarched than are these flocks of starlings, except, perhaps, an unfortunate few, who are usually thrown out at each change, and whom we must charitably suppose to be recruits.

The starling lives principally among old buildings, and is very fond of gaining admittance into dovecotes, where it

is a harmless visitor, and may be suffered to remain without detriment to the pigeons or their eggs. Its nest is made usually in a hole in a wall, sometimes in a decayed tree, and contains five eggs of a very delicate uniformly pale blue. There

is never any difficulty in discovering the nest of the starling, for if it builds in a hole of a wall it generally leaves several straws sticking out, as if to indicate the locality; and when it goes to take food to its young, both parent and children set up such an outcry that it may be heard a long way off. Consequently, there are few eggs so prevalent in the string of the country boy as those of the starling.

The GROSBEEK or HAWFINCH.—We now arrive at the FINCHES—a very numerous and interesting family. None of the species are large, and most of them are excellent songsters. Their beaks are conical, and fitted for the destruction of corn, peas, etc.

The grosbeak, or hawfinch, well deserves its generic name of “Berry-breaker,” for its beak is capable of breaking the hard kernels of the cherry, and, according to Willoughby, even those of the olive. It is not a very rare bird, although it is but seldom seen. This fact is accounted for by its great shyness and dread of mankind; so that, although it remains in some sections throughout the year, it seldom ventures out of the thick woods in which it delights to dwell. The nest of this bird is very shallow, and slightly put together, being hardly superior to that of the wood-pigeon. The eggs are from four to six in number, of a greenish white, covered with dark marks and spots. The length of the grosbeak is seven inches.

The CHAFFINCH, or PIEFINCH, as it is often called, is so well known as to need no description. It is chiefly remarkable for the beautiful nest which it constructs. The forks of a thorn or wild crab-tree are favorite places for the nest, which is composed of mosses, hair, wool, and feathers, covered on the exterior with lichens and mosses, so exactly resembling the bough on which the nest is placed, that the eye is often deceived by its appearance. In the nest four or five very pretty eggs are laid: these are of a reddish-brown color, sparsely marked with deep brown spots, especially toward the larger end. The name *Cœlebs*, or Bachelor, is given to this bird, because the females quit this section about November, leaving large flocks of males behind them.

The GOLDFINCH, or THISTLEFINCH, so called on account of its fondness for the down of the thistle, is one of our most beautiful birds. Where thistles abound, small flocks of goldfinches may be seen flying from hedge to hedge, and occasionally pecking the white tops of the thistles. The tufted seed of the dandelion, groundsel, and other plants is also eaten by the goldfinch. In captivity it is very tame, and can be trained to perform a multitude of tricks, the most common of which are drawing its own food and water with a chain and bucket, or firing a gun when commanded. The nest is very beautiful, being mostly made of wool and down from various plants, and is usually placed on the extremity of a spray. The eggs are small, of a whitish tint, spotted with orange brown.

The COMMON LINNET frequents commons and neglected pastures. Its song is very sweet, and many bird-fanciers suppose that the mixed breed of a canary and a linnet has a sweeter song than either bird. Its nest is usually built in the centre of

a large and dense bush. The eggs are five in number, grayish-white speckled with red.

The CANARY.—This pretty little songster is so well known as to need but little description, particularly as there are no opportunities of studying its natural course of life. From the manner in which the canary is usually reared, it is evident that the bird has but very little opportunity of exhibiting its natural instincts.

The SPARROW.—The courageous, impudent, quarrelsome sparrow is known to all, and, therefore, will not be particularly described. There are few who have not seen this little bird, when pressed by cold in the winter, come to the window, expecting his donation of crumbs. It is very fond of grain of various kinds, and does some damage to the farmer, but the destruction of caterpillars by the bird more than compensates for the loss of the grain. The little impertinent bird has no scruple in perching on the pig's trough, and partaking of his dinner, or in mixing with fowl and taking its share of their provisions; and on a newly-thatched house it absolutely revels. Dozens of sparrows may then be seen pecking and pulling at the straws in high enjoyment. I was once watching a flock of sparrows on a newly-thatched barn, hopping, pecking, and scrambling in perfect happiness, when suddenly a sharp twitter was heard, and the whole body hastily adjourned to a tree close by, making a prodigious chattering. Presently I saw appear, over the ridge of the house, the head of a cat, who had walked up the thatcher's ladder, hoping to secure a few sparrows in the midst of their meal. The nest of the house sparrow is usually built in holes of roofs. The eggs are speckled black and white, and very variable.

The YELLOW-HAMMER, or YELLOW BUNTING, is a very delicately marked little bird, very common in our hedges, where it flits before the traveller, always keeping about twenty yards in front. It makes its nest on the ground, and lays five eggs curiously scribbled over with dark chocolate lines, just as if a child had been trying to write Arabic on the eggs. Some say that the name ought to be Yellow-Ammer, the word *ammer* being German for *bunting*, and the German word for this bird being Goldammer.

The LARKS are known by their very long hind toe. The skylark, which pours forth its animated song while suspended high in the air, is an inhabitant of most parts of Europe, Asia, and North Africa, but is not found in America. A very interesting story is told of a skylark that was brought out to this country by a poor emigrant, and which used to collect crowds of delighted listeners round its cage. An English settler, who happened to be passing by while the bird was singing, was so affected by the reminiscences which its song called up, that he offered his horse and cart for the bird, on the spot. The owner, however, would take no price for it, although most extravagant offers were made, and kept it till his death. The bird afterward passed into other hands, but refused to sing until its cage was hung up in the open air. After its death, its skin was sent back to its native land, and is now stuffed, seated in its old cage, with a suitable inscription attached.

The nest is made on the ground, frequently in the print of a horse's foot, and contains five eggs of a greenish-white, thickly spotted with brown. There are generally two broods in the year; one in May, and the other in July or August. Immense numbers of these birds are caught annually and sent to the London markets. The mode of catching the larks is generally by means of a number of horsehair nooses attached to a long line. Food is scattered among the nooses, and the larks in reaching the food get their limbs entangled in the horsehair, and either strangle themselves, or are held until the fowler comes to take them out. Dunstable is the most celebrated place for them. It does not at all agree with the sense of justice, that these beautiful birds, who charm us with their voices, should be killed to increase the pleasures of the table.

The BULLFINCH affords a singular instance of the power of art on the song of birds. The natural note of the bullfinch is low, and can only be heard at a short distance; but when well trained the bird whistles, or "pipes," as it is called, any melody which had been taught it, in a fine flute-like tone. A good piping bullfinch sells at a very high price. The method of teaching is to confine the birds in a dark room, and, before their food is given to play the air that they have to learn, on an instrument called a bird-organ. The birds soon begin to imitate the notes, and by degrees the whole tune is learned. Some trainers substitute a small clarinet for the bird-organ. When in captivity the bullfinch is very sociable, and soon learns to know his owners, and to come to them when called.

The nest of this bird is made in thick bushes, or fir-trees. The eggs are of a pale greenish white, spotted with orange brown. The name of bullfinch is given to it on account of the large proportionate size of its head and neck. When in captivity, its plumage sometimes turns black, the result of feeding it too profusely with hemp-seed.

THE RHINOCEROS HORNBILL.—This singular and almost startling family comprises but few species, which are all natives of India and Africa. The enormous bill, with its incomprehensible appendage, although heavy, is really much lighter than it looks; being composed of a kind of light honeycombed structure. The upper protuberance is hollow, and the only conjecture formed of its use is that it serves as a sounding-board to increase the reverberations of the air while the bird is uttering its peculiar roaring cry. In spite of the apparently unwieldy bill, the bird is very active, and hops about the branches of the trees with much ease. The appendage to the upper mandible is small when the bird is young, and only attains its enormous size when the hornbill has reached its full growth. The bill of the hoopoe presents a somewhat analogous peculiarity, as when the bird is young the bill is short and pointed, and increases with the size of the bird. From this circumstance, together with some other resemblances, some naturalists imagine that there is an affinity between the hornbills and hoopoes.

The hornbills seem to be omnivorous, fruits, eggs, birds, reptiles, etc., forming

their food. The African hornbills are extremely fond of nutmegs, and are, on that account, said to be peculiarly delicate eating, reminding one of the Barmecide's memorable lamb fed on pistachio nuts. The rhinoceros hornbill is a native of India and the Indian islands. The length of its bill is usually about ten inches.

The SCANSORES, or CLIMBING BIRDS, now engage our attention. According to Mr. Gray, under this order are placed the Toucans, the Parrots, the Woodpeckers, and the Cuckoos. The feet of these birds have two toes in front and two behind. The toucans are all natives of tropical America. Their enormous bill is rendered light in the same way as that of the hornbills, by being chiefly composed of a honey-comb structure. It seems to be very sensitive, and well supplied with nerves, as the bird not only appears to enjoy holding meat or fruits with the tip of its bill, but has been seen to scratch that organ with its foot, plainly proving that there must be sensation. It seems to be omnivorous, but is particularly fond of mice and small birds, which it kills by a powerful squeeze, then strips and finally pulls to pieces and devours, having previously reduced them to a shapeless mass by repeated lateral wrenches with its enormous and saw-like bill. When sleeping, the toucan takes great care of its bill, packing it away, and covering it carefully with the feathers of its back, and altogether presents the appearance of a large round ball of feathers. The body is about eighteen inches in length. These birds, together with the hoopoes and hornbills, have a habit of throwing their food down their throats with a peculiar jerk of the bill.

The MACAWS.—Many naturalists imagine, and with some reason, that the Psittacidæ ought to be formed into an order by themselves. In this family the construction of the bill is very remarkable. As the curved tip of the bill would prevent the bird from opening it wide enough to admit its food, the upper mandible is united to the skull by a kind of hinge joint, of equal strength and flexibility. When climbing among the branches of trees, or about their cages, the parrots invariably make great use of their hooked bills in assisting themselves both in ascending and descending. The crossbills have been observed to climb much in the same way. The parrots are said to be very long-lived; some have certainly been known to live upward of eighty years in captivity, and may be imagined to exceed that period in a wild state. The macaws are natives of South America. The blue and yellow macaw inhabits Brazil, Guiana, and Surinam, living principally on the banks of rivers.

The RINGED PAROQUET is frequently seen domesticated in this country, where its pleasing manners and gentle disposition render it a great favorite. It seems to be exceedingly fond of ripe walnuts, divided in halves; and, while it is picking out the kernel, continually utters a short clucking sound indicative of pleasure.

It soon learns to repeat words and short sentences, and to speak with tolerable distinctness. Sometimes, when excited, it utters most ear-piercing screams, and always appears to practise any new accomplishment when it thinks that no one is

within hearing. A ringed paroquet belonging to one of my scholars was accustomed to live in the school-room. At first it used to become angry that it was not noticed during school hours, and to utter a succession of screams; but after being shut up in a dark closet several times, it learned to behave very demurely—giving an example worthy of imitation to several of its human playfellows. I am sorry to say that the bird escaped from its cage, and was shot by an ignorant farmer in the neighborhood. The color of the bird is green, and a rose-colored band round its neck gives it the name of the rose-ringed paroquet. The bill is red.

The COCKATOOS are remarkable for the powdery surface of their wings, and the crest on the head, which can be raised or depressed at pleasure. The Sulphur-crested Cockatoo is an inhabitant of New Guinea. Its color is white, and the crest is of a sulphur yellow. Its white plumage glancing among the dense, dark foliage of its native forests imparts a wonderful beauty to the scene; and as Sir Thomas Mitchell remarks, "Amidst the umbrageous foliage, forming dense masses of shade, the white cockatoos sported like spirits of light." This cockatoo is easily tamed, and is of a very affectionate disposition. When in captivity it has been known to live to the age of 120 years. Its nest is built in hollow trees and the crevices of rocks. The eggs are white. The length of the bird is about eighteen inches.

The WOODPECKERS, whose name indicates their habits, are widely spread, being



PAROQUET.—*Melopsittacus undulatus*.

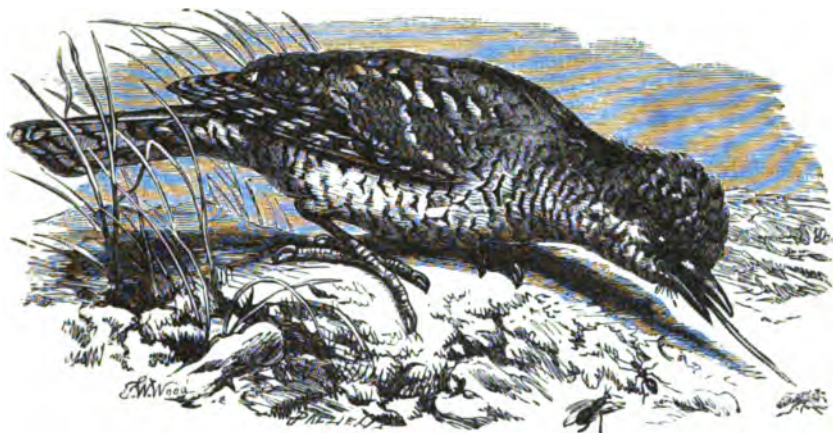
found in all quarters of the globe except Australia. They subsist on insects and grubs, which they dig out of trees, or discover under the bark. For this purpose their whole structure is admirably adapted. The bill is long, sharp, and powerful, and the formation of the feet and legs is such that the bird is able to grasp the tree firmly with the feet, while swinging with the force of his whole body against it. Another most singular point in the woodpeckers is the method by which they are enabled to thrust the tongue deep into the crevices, and bring out any insects that may happen to be there. The tongue is connected with two elastic ligaments which are inserted near the juncture of the upper mandible with the skull. From thence they sweep round the back of the head, and passing under the lower mandible, enable the tongue to be thrust out a considerable distance. The tip of the tongue is sharp, and barbed with several filaments; and more firmly to secure the prey, a kind of gummy secretion causes those insects to adhere that would be too small to be impaled.

It appears to be an erroneous opinion that these birds injure trees. Their only object in pecking away the wood and bark is to get at the insects, which they know are hidden within. Now insects seldom or never bore into healthy wood, but a decayed branch or stump is always full of them, as is well known to the entomologist; so the winged entomologist, when he perceives a decayed branch, or finds an unsound spot in the trunk, immediately sets to work industriously, and is rewarded by finding plenty of insects, which he draws out and demolishes, with more benefit to himself, and possibly more good to others, than many human entomologists can boast. Although the woodpecker does not scoop away sound trees, yet it is because it has no motive for doing so—not that the power is wanting. Wilson had an Ivory-billed Woodpecker in his possession, which pecked away lath and plaster in its efforts to escape, and utterly ruined a mahogany table to which it was fastened.

The Green Woodpecker is by far the most common in this country, and may be often seen in woods, tapping the trees with wonderful rapidity, the blows following each other something like the sound of a watchman's rattle. It generally runs up the trunk of the tree in a spiral direction, occasionally striking off large pieces of dry bark. When it descends, it still keeps its head uppermost. I have more than once seen the green woodpecker busily employed among the trees of the Christ Church Walks, and very frequently in Bagley Wood. I have never seen it on the ground, and but once on the smaller branches of the trees.

The WRYNECK is common in the southern counties of England, but is scarcely ever seen in the north and west. It principally feeds on ants, which it picks up with great rapidity by means of its long tongue, covered with a glutinous secretion like that of the woodpecker. The rapidity with which the ants are taken is so great, that "an ant's egg, which is of a light color, and more conspicuous than the tongue, has somewhat the appearance of moving to the mouth by attraction, as a needle does to the magnet." The term wryneck is given it from its habit of rapidly

twisting its head and neck, and hissing like a serpent, if disturbed upon its eggs. The young also hiss if they are molested. Its eggs are laid on the bare wood in the



WRYNECK.—*Yunx torquilla*.

holes of trees. Like most eggs that are laid in holes, they are of a pure white. The length of the bird is seven inches.

The Cuckoo, spring's harbinger, has, in all ages, obtained for itself a name at once pleasing and disreputable; pleasing, because its well-known notes are a sign that the cold winter is gone; and disreputable, because it usurps the nests of other birds, of which the hedge-sparrow is the usual victim. In its nest the cuckoo deposits one of its own eggs, which are remarkably small in proportion to the size of the bird. The unsuspecting hedge-sparrow hatches the intruder together with her own young. The cuckoo rapidly increases in size, and monopolizes no small portion of the entire nest, besides taking the lion's share of the provisions. The mother, however, never seems to perceive the difference, but feeds and tends the interloper with quite as much care as her own young. Dr. Jenner states that the young cuckoo ejects the former and rightful occupants of the nest, by managing to get the egg or young bird upon its back, clambering up to the edge of the nest, and then throwing it over by a sharp jerk.

At some times of the year, cuckoos are comparatively tame. I have repeatedly decoyed them by imitating their cry, until they came near enough for me to see the movement of the beak. Once a cuckoo came voluntarily, and settled on a hurdle close by, uttered his peculiar cry several times, and then leisurely flew off. The cuckoo feeds principally on the hairy caterpillars, especially those of the tiger moth (*Arctia caja*), the hairs of which form a kind of lining to its stomach. These hairs are placed so regularly, that it was imagined for some time that they were a growth

from the stomach itself. To settle the point, the microscope was brought to bear on the subject; and by its aid the hairs were found to be exclusively those of the caterpillar above mentioned. The cuckoo will also feed on other insects, as is proved by Gilbert White, who saw several cuckoos engaged in feeding by a large pond. They were chiefly employed in catching the dragon-flies, some of which they took while resting on the water-plants, and others they caught on the wing. A tame cuckoo, that lived for more than a year in captivity, seemed to consider a young mouse an especial treat. The mouse was first beaten against the ground on



CUCKOO.—*Cuculus canorus*.

a hard stone, until it was reduced to a soft mass, after which process it was swallowed. The length of the bird is about fourteen inches.

The DOVE.—This family is supposed to be more widely distributed than any other. The Ringdove, or Cushat, is the largest of our native pigeons. A black ringlet round the neck, edged with white, gives it the name of ringdove. It is very common in America; and its nests are usually found to consist of a few sticks, thrown loosely together on a spray of fir or holly. The structure of this platform, for nest it can hardly be called, is so loose, that the white eggs can generally be seen from below through the interstices of the nest.

The following group comprises the most conspicuous varieties of the Domestic



OWL AND GAME.

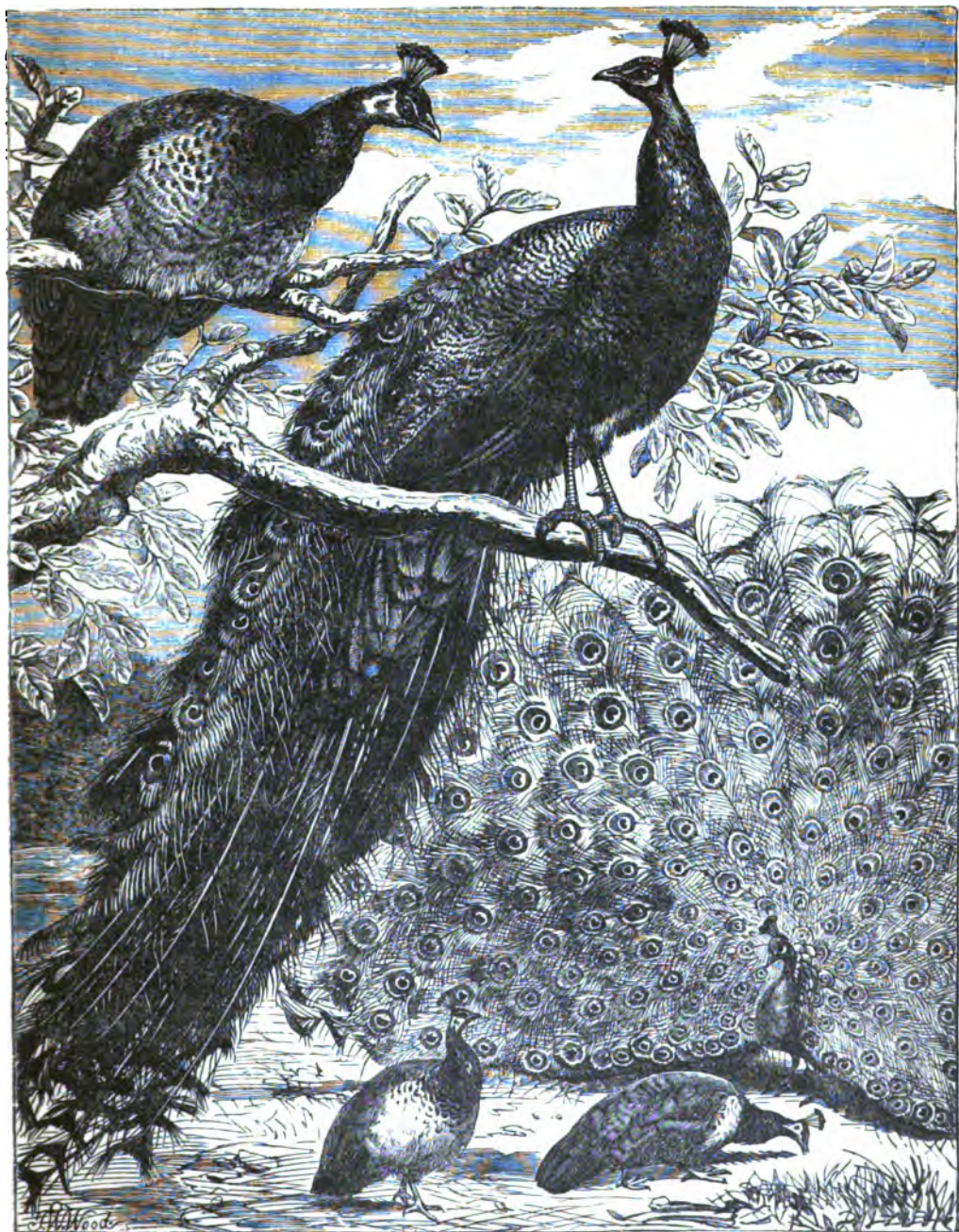
Pigeon. All these birds except the Carrier, the Pouter, and Tumbler, are very similar in their habits, and need no description. The tumbler is a very little pigeon, and derives its name from its singular habit of falling backward when on the wing. Pigeon fanciers assert that a flight of twelve tumblers may be covered with a handkerchief. The pouter is a large pigeon. It stands particularly erect, and seems exceedingly vain of the swollen crop which gives it the name of pouter. The bird is enabled to inflate its crop with air, until the head is almost hidden behind it. This inflation sometimes causes the bird to lose its balance, and fall down chimneys, on which it is fond of standing, thereby illustrating the proverb that "Pride will have a fall."

The carrier pigeon is the bird that was so largely employed to take messages, before the invention of the electric telegraph rendered even the speed of the wind too slow for the present day. The most valuable carriers were trained to carry to and from their residence. A letter was written on a small piece of paper, and fastened under the wings of the pigeon, or to its feet. The feet were then bathed in vinegar to keep them cool, lest the bird should stop on the way to bathe. When the pigeon was set free, it rose high in the air, made one or two circular flights, and then darted off like an arrow in the proper direction. One of these birds has been known to fly nearly one hundred and fifty miles in one hour.

The PEACOCK.—This magnificent bird is not a native of this country, but has been domesticated in America for many years. Some suppose that it was first brought from India by Alexander, and by him introduced into Europe. The gorgeous plumes that adorn the peacock do not compose the tail, as many suppose, but are only the tail coverts. The tail feathers themselves are short and rigid and serve to keep the train spread, as may be seen when the bird walks about in all the majesty of his expanded plumage. Although pea-fowl seek their food on the ground, they invariably roost on some elevated situation, such as a high branch, or the roof of a barn or haystack. When the bird is perched on the roof, its train lies along the thatch, and is quite invisible in the dark.

We have almost dismissed pea-fowl from our entertainments in these days, but in the times of chivalry, a roasted peacock, still clothed in its plumage, and with its train displayed, formed one of the chief ornaments of the regal board. The nest of this bird is made of sticks and leaves rudely thrown together, and contains from twelve to fifteen eggs. The young do not attain their full plumage until the third year, and only the males possess the vivid tints and lengthened train, the female being a comparatively ordinary bird. A white variety of the peacock is not uncommon. In this case, the eyes of the train feathers are slightly marked with a neutral tint. The voice of the peacock is as unpleasant and unmusical as its external appearance is attractive.

The COMMON PHEASANT was originally brought from Georgia, but has completely naturalized itself in other countries. It is a hardy bird, and bears the cold



PEACOCK.—*Pavo cristatus*.

months very well. Although it can be tamed, and will come to be fed with the poultry, yet an innate timidity prevents it from being thoroughly domesticated. Young pheasants that have been hatched under a hen, scamper off in terror if an unexpected intruder makes his appearance among them, although the remainder of the poultry remain perfectly unconcerned. This bird loves to perch at night on trees especially on the spreading branches of the larch. Poachers are so well aware of this habit that they always visit the larches first, while on their marauding excursions.

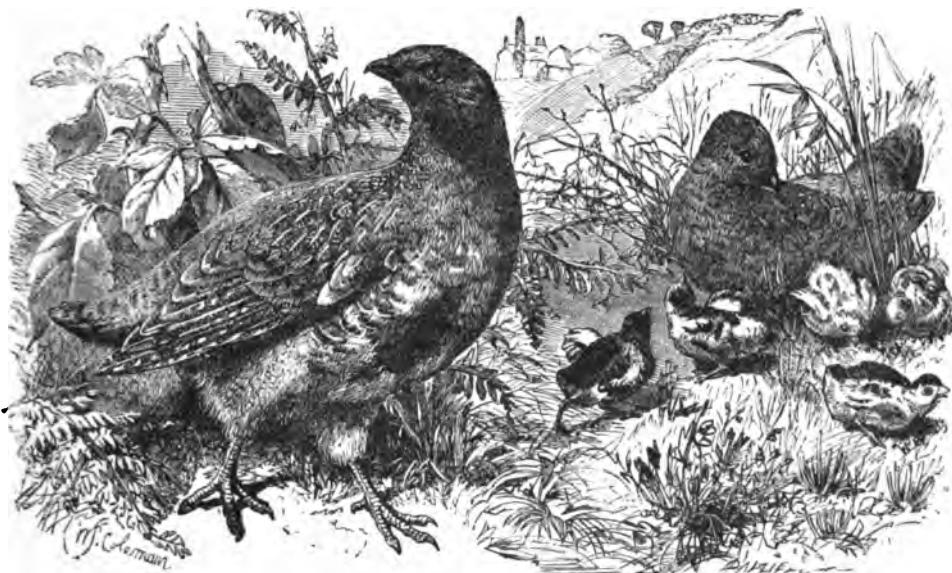
A few spruce-firs surrounded by dense and tall holly hedges form an excellent place of refuge for the birds, who can bid the poacher defiance from their stronghold ; while a few dozen wooden pheasants nailed on the branches of the unguarded trees are admirably adapted for trying the patience and wasting the ammunition of the nocturnal plunderer. A white variety of the pheasant sometimes occurs, but seems never to be propagated. The nest of the bird is made on the ground, and contains from ten to eighteen eggs of a uniform dun color.

The DOMESTIC FOWLS are too well known to need much description. There are many varieties, the most conspicuous of which are the Cochín-China, Crested, and Bantam. The Game Fowl was formerly in great request for the cruel sport of cock-fighting, an amusement which, although happily now almost extinct, was in great vogue but a few years since. The Java Fowl, of which the enormous Cochín-China bird is a variety, is supposed to be the origin of the Barn-door fowl. The cock has been long celebrated for his warlike propensities, and his habit of greeting the approach of morn by his "shrill clarion."

The bantam is a very little bird indeed, but exceedingly courageous, and does not hesitate to attack a turkey or such large bird with most amusing pompousness of manner. Some bantams have their legs thickly feathered down to the very toes. The hackles, or long neck feathers of this and the preceding bird, are much used by anglers for making artificial flies. The celebrated Jungle Fowl of India belongs to this race, and is by many supposed to be the origin of our domestic game fowl. The Chinese, who are greatly addicted to the sport of cock-fighting, prefer this bird for their cruel amusement. The Dorking Fowl is a large and delicate species. The chief peculiarity in this bird is the double hind toe, so that it has five toes instead of four.

The TURKEY is an inhabitant of America, and appears to have been imported into Europe about the year 1600. Its habits in a state of domestication need no description, but when wild in its native woods are rather interesting. It is partly migratory in its habits, moving from the parts about Ohio, Kentucky, and Indiana, toward the Ohio and Mississippi. The march is usually performed on foot in large flocks, the birds seldom using their wings except when attacked, or in order to cross a river. The powerful birds can easily cross a river of a mile in breadth, but the weaker frequently fall into the water, and then paddle to shore with some rapidity. This migration is performed about the end of October.

Among the birds rightly called GROUSE are the Pheasant-tailed Grouse or Cock of the Plains, the Pinnated Grouse, commonly called the prairie hen or chicken, and the Ruffed Grouse, called partridge in New England, and pheasant in the Middle States. The cock of the plains is found only in the far West; it is the largest of the American grouse, being often as large as a turkey.



PARTRIDGE.—*Perdix cinereus*.

The prairie hen was once common in New York and other Atlantic States, but is now seldom found anywhere but in the prairies of the West. It lives on berries, grains, acorns, etc., and is much prized for food. Great numbers of them are shot or taken in nets and traps every autumn and sent to the Eastern markets.

The QUAIL (Bob White so called) is a quite common little bird, visiting America in the summer. Countless flocks of them are spread over the Southern and Middle States, and many are taken and sent to the New York markets.

Temminck states that in their flight to Southern Europe hundreds of thousands arrive in Naples and Provence, and are so fatigued that for several days they suffer themselves to be taken by hand. We are here reminded of the flight of quails with which the Israelites were fed, the sacred narrative even preserving the nocturnal flight of these birds. "And it came to pass that *at even* the quails came up and covered the camp." Probably the instinct to fly by night is implanted in them for

the purpose of avoiding the birds of prey that would attack them by day. The female lays from seven to twelve eggs in a rude nest on the ground. The length of the bird is seven inches; the second primary feather is the longest.



QUAIL.—*Coturnix communis*.

The PTARMIGAN.—The legs and feet of the ptarmigans are thickly covered with hair-like feathers, reaching as far as the claws. Their plumage bears a singular analogy to the fur of the ermine and some other quadrupeds, as it changes in winter from a rich tortoise-shell color to a pure white. The common ptarmigan inhabits the northern parts of Europe and America, and is also found in the north of Scotland, principally among the mountains. The color of the bird is so similar to that of the mossy and lichen-covered rocks among which it dwells, that a whole covey easily eludes an unpractised eye.

Enormous numbers of ptarmigans are annually imported from the north of Europe, especially from Norway and Sweden, to the London market. One poulterer has purchased fifteen thousand of these birds; and twenty-four thousand have been exported in one ship from one place. Like that of the grouse, the ptarmigan's nest is a loosely-constructed heap of twigs and grass, and contains from ten to fourteen eggs, of a reddish white spotted with brown.

The MOUND-MAKING MEGAPODE inhabits the dense thickets bordering on the sea-shore, and is never found far inland. Like the brush turkey, it deposits many

eggs in one mound, but instead of placing them at intervals in the mound, the bird makes deep holes, from five to six feet, at the bottom of which the eggs are deposited. The natives obtain the eggs by scratching up the earth with their fingers, until they have traced the hole to the bottom; a very laborious task, as the holes seldom run straight, and often turn off at right angles to avoid a stone or root. The mounds are enormously large. Mr. Gilbert was told by the residents that they were the tombs of the aborigines, nor was it until after some time that their real nature was made known. The height of one mound was fifteen feet, and its circumference at the base sixty feet.

The OSTRICH.—The Struthionidæ include the Ostrich, Emu, Cassowary, and Apteryx. The birds of this family are all remarkable for the shortness of their wings, which are weak and unable to raise them from the ground, but appear to assist them in running. On this account, Cuvier called the family Brevipennes, *i.e.* short-winged birds.

The ostrich is the largest bird as yet known to exist, its height being from six to eight feet. It is an inhabitant of Africa, and from thence the elegant plumes are brought. These plumes are mostly obtained from the wings of the bird, and not from the tail, as is generally imagined. An immense number of eggs are laid by the ostriches in one spot, several birds belonging to each nest. The eggs are very large and strong, and are in general use by the Bosjesmans for holding water. By means of these eggs, which they bury at intervals in the sand, after filling them with water, they are enabled to make inroads across the desert and retreat with security, as none can follow them for want of water. Each egg holds rather more than five pints. An excellent omelet is made by the natives, by burying the fresh egg in hot ashes, and stirring round the contents with a stick through a hole in the upper end, until thoroughly cooked.

The principal strength of the ostrich tribe lies in the legs. These limbs are so powerful that a swift horse has great difficulty in overtaking the bird. As the ostrich mostly runs in large curves, the hunters cut across and intercept the bird, which would in all probability escape if followed in its exact course. The ostrich is easily tamed, as those who have been pursued by the magnificent birds in the Zoological Gardens can testify. These frequently astonish the visitor by suddenly snatching out of his hand a bun or cake which he had intended for his own especial benefit, their long necks enabling them to reach to a surprising distance. Many of my readers have doubtless seen the tame ostriches at the Hippodrome, who ran races bearing riders on their backs, and really seemed to enjoy the sport as much as any of the spectators. The interesting narrative of Captain Cumming contains some useful remarks on the habits of the ostrich, and the method in which it is destroyed by the Bosjesmans.

“While encamped at this vley we fell in with several nests of ostriches; and here I first ascertained a singular propensity peculiar to these birds. If a person

discovers the nest, and does not at once remove the eggs, on returning he will most probably find them all smashed. This the old birds almost invariably do, even when the intruder has not handled the eggs, or so much as ridden within five yards of them. The nest is merely a hollow scooped in the sandy soil, generally among heath or other low bushes; its diameter is about seven feet; it is believed that two hens often lay in one nest. The hatching of the eggs is not left, as is generally believed, to the heat of the sun, but, on the contrary, the cock relieves the hen in the incubation. The eggs form a considerable item in the Bushman's cuisine, and the shells are converted into water-flasks, cups, and dishes. I have often seen Bush-girls and Bakalahari women, who belong to the wandering Bechuana tribes of the Kalahari desert, come down to the fountains from their remote habitations, sometimes situated at an amazing distance, each carrying on her back a kaross, or a net-work containing from twelve to fifteen ostrich egg-shells, which had been emptied by a small aperture at one end; these they fill with water, and cork up the hole with grass.

"A favorite method adopted by the wild Bushman for approaching the ostrich and other varieties of game, is to clothe himself in the skin of one of these birds, in which, taking care of the wind, he stalks about the plain, cunningly imitating the gait and motions of the ostrich, until within range, when, with a well-directed poisoned arrow from his tiny bow, he can generally seal the fate of any of the ordinary varieties of game. Their insignificant looking arrows are about two feet six inches in length; they consist of a slender reed, with a sharp bone head, thoroughly poisoned with a composition, of which the principal ingredients are obtained sometimes from a succulent herb, having thick leaves, yielding a poisonous milky juice, and sometimes from the jaws of snakes. The bow barely exceeds three feet in length; its string is of twisted sinews. When a Bushman finds an ostrich's nest he ensconces himself in it, and there awaits the return of the old birds, by which means he generally secures the pair. It is by means of these little arrows that the majority of the fine plumes are obtained which grace the heads of the fair throughout the civilized world."

The food of the ostrich is vegetable, and it swallows many stones, etc., to assist it in grinding its food. When in confinement it picks up anything, glass, nails, etc., from the effects of which it sometimes dies. I have assisted at the dissection of an ostrich, and have seen an astonishing amount of pebbles and other hard materials taken from its stomach, among which were a tolerably large piece of deal and a considerable portion of a brickbat. Capt. Cumming remarks a fact not generally known, viz., the care that the ostrich takes of its young. It has generally been supposed, that after the eggs are laid the female leaves them to be hatched in the sun, and takes no more care for them. The following anecdote would do honor to the far-famed lapwing: "I fell in with a troop of about twelve young ostriches, which were not much larger than Guinea-fowls. I was amused to see the mother endeavor to lead us away, exactly like a wild duck, spreading out

and drooping her wings, and throwing herself down on the ground before us as if wounded, while the cock bird cunningly led the brood away in an opposite direction.

The Rhea, or American Ostrich, is abundant on the banks of the river La Plata, and is chased by the Gauchos, who pursue it on horseback, and kill it by throwing the celebrated "bolas." These curious weapons are made of a long leathern thong, having a heavy stone or leaden ball attached to each end. The Gaucho can throw it so as either to stun his prey with a blow from the ball, or strangle it by causing the thong to twist round its neck. It is known that the rhea can swim well, and it has been seen to cross rivers several hundred feet in width, a power which the ostrich and the cassowary are not ascertained to possess. There are two species of this bird, one, the Darwin's Rhea, has been but lately introduced to science.

The CASSOWARY is a native of the eastern parts of Asia. Like the ostrich, it cannot fly, but runs with great swiftness, and if attacked by dogs kicks with extreme force and rapidity. The feathers of this bird are remarkable for being composed of two long, thread-like feathers, sprouting from the same root. The wing feathers are round, black, and strong, and resemble the quills of the porcupine. At the end of the last joint of the wing is a sort of claw or spur. The crest upon its head is composed of a cellular bony substance. The food of the bird consists of vegetable substances, and it will frequently swallow a tolerably large apple entire, trusting to the pebbles, etc., in its stomach to bruise it.

The EMU is a native of New Holland, and nearly equals the ostrich in bulk, its height being between five and six feet. Its feathers lie loosely on the body, and its wings are small and hardly to be distinguished. The skin of the emu furnishes a bright and clear oil, on which account it is eagerly sought after. Mr. Bennett gives the following account of the habits of this bird :

"In its manners the emu bears a close resemblance to the ostrich. . . . Its food appears to be wholly vegetable, consisting chiefly of fruits, roots, and herbage, and it is consequently, notwithstanding its great strength, perfectly inoffensive. The length of its legs and the muscularity of its thighs enable it to run with great swiftness ; and as it is exceedingly shy, it is not easily overtaken or brought within gunshot. Captain Currie states that it affords excellent coursing, equalling if not surpassing the same sport with the hare ; but Mr. Cunningham says that dogs will seldom attack it, both on account of some peculiar odor in its flesh which they dislike, and because the injuries inflicted upon them by striking out with its feet are frequently very severe. The settlers even assert that the emu will break the small bone of a man's leg by this sort of kick ; to avoid which, the well-trained dogs run up abreast, and make a sudden spring at its neck, whereby it is quickly dispatched. Its flesh has been compared to coarse beef, which it resembles both in appearance and taste. There is but little fit for culinary use upon any part of the emu except the hind quarters."

The voice of the emu is a kind of low booming sound. The eggs are six or seven in number, of a dark green color, and are much esteemed by the natives as food. When the natives take an emu, they break its wings, a curious custom of no perceptible utility. Young men and boys are not permitted to eat the flesh of this bird.

The APTERYX.—This extraordinary bird, whose name is derived from the apparent absence of wings, those members being merely rudimentary, inhabits the islands of New Zealand. It conceals itself among the densest fern, and when hunted by dogs, it hastens to seek a refuge among rocks and in the chambers which it excavates in the earth. In these chambers its nest is made and the eggs laid. The natives hunt it with great eagerness, as the skins are used for the dresses of chiefs, who are so tenacious of them that they can hardly be persuaded to part with a single skin.

The feathers are employed to make artificial flies. When attacked it defends itself by rapid and vigorous strokes with its powerful feet.

Dr. Shaw first brought this bird before the notice of the public, but for many years naturalists considered it an extinct species. Latterly the question has been set at rest, not only by the researches of Gould and other naturalists, but by the arrival in this country of several skins and one living specimen, now in the Zoological Gardens. This bird has a singular habit of resting with the top of its bill placed on the ground. The nostrils of the apteryx are placed almost at the very extremity of the bill. The aborigines of New Zealand give it the name of Kiwi Kiwi. The food of the bird consists of snails, insects, and worms, which latter creatures it obtains by striking the ground with its feet, and seizing them on their appearance at the surface.

The DODO.—This singular bird, which is supposed to be extinct, was discovered in the Mauritius by the earlier voyagers. For many years their accounts of the Dodars were supposed to be mere flights of fancy. Lately, however, the discovery of several relics of this bird in various countries has set the question of its existence at rest, but not the question of the proper position of the bird. Some think it belongs to the pigeons, and some to the ostriches. In the Museum at Oxford are a head and foot of the dodo, sole remnants of a perfect specimen known to have existed in 1700; and in the same place, in the year 1847, during the meeting of the British Association, were gathered together the whole of the existing remains from every country.

In the travels of Sir T. Hubert, in the year 1627, are several accounts. From the work of this traveller, whose amusement it was to rewrite his travels, each time completely changing the language but retaining the matter, an extract is taken: "The dodo, a bird the Dutch call Walghvogel, or Dod Eersen; her body is round and fat, which occasions the slow pace, or that her corpulencie, and so great as few of them weigh less than fifty pound: meat it is with some, but better to the eye than stomach, such as only a strong appetite can vanquish. . . . It is of a melan-

choly visage, as sensible of nature's injury in framing so massie a body to be directed by complimental wings, such, indeed, as are unable to hoise her from the ground, serving only to rank her among birds. Her traine, three small plumes, short and impropportionable, her legs suiting to her body, her pounces sharpe, her appetite strong and greedy. Stones and iron are digested; which description will better be conceived in her representation." The "representation" here alluded to is that of a globular shaped bird, perfectly naked, with the exception of three separate feathers on the tail, and a few feathers on the wing. The expression of lugubrious wisdom on the countenance is irresistibly ludicrous. It is still within the range of possibility that the bird may again be discovered, as at present but little of Madagascar has been searched, and in that island, if anywhere, it will be found.

The PLOVERS are known by their long legs, short toes, and long, powerful wings. Many are inhabitants of America, of which the Upland or Field and Golden Plover are the most common.

The Golden Plover is very common in most parts of the United States, and is well known from its plaintive cry, and the stratagems it employs to decoy intruders away from its nest, or rather eggs, for nest it has none. Frequently, however, the attempts of the bird only draw the attention of the passer-by to the evident vicinity of the eggs. These eggs are dark brown, blotched with black, and are hardly to be distinguished from the soil where they are laid. If an intruder approach them, the bird glides before him, and flutters along, drooping her wings, as if wounded, invariably endeavoring to lead him away from her nest. When it has succeeded in decoying away the intruder, it suddenly mounts in the air, uttering its cry of pee-weet, leaving the pursuer to gaze with astonishment at the escaping bird. The eggs are sold under the title of "plovers' eggs," and are considered great delicacies. When flying, the black and white colors of its plumage make it very conspicuous. On the head of the bird is a kind of crest.

The COMMON CRANE is now but rarely seen on our shores, although formerly as common as was the bustard. It flies at so great a height that, although its hoarse cry is audible, the bird itself is far out of the reach of sight. It generally feeds on snails, frogs, and worms, but is not by any means averse to newly-sown grain. The nest is made among reeds and rushes, and contains two bluish-green eggs, marked with brown. The length of the bird is nearly four feet.

The HERON, or HERNE, is a bird renowned in the noble science of falconry, and respecting which much curious knowledge is to be gained from the work of Dame Juliana Berners, a book of most amusingly quaint language. The common heron generally breeds in company, like the rooks; indeed, these two birds frequently inhabit contiguous trees, but never interfere with each other. In the dawn of the early morning, or while the moon casts an uncertain light, the heron may be seen standing in the shallow water, stiff and motionless, and by the faint light may be mistaken for a stump of a tree. But his eye is keenly directed on the water,

and no sooner does a fish approach, than a dart of his unerring bill secures it, and the heron soars exultingly to his nest, bearing his prey with him. The fixed patience that the heron displays has caused it to be chosen as the emblem of solitude.

The plumes of the heron were formerly considered as ornaments only to be worn by the noble. It is not an uncommon sight to see this splendid bird slowly winnowing his way through the air, when suddenly a magpie, or a crow, gives the alarm, and the poor bird is instantly beset by its annoying enemies, especially the crows, who resent the heron's approach to their own residence, and frequently drive him away. There was, and may be still, a belief that the legs of the heron exhaled some scent that was attractive to the fish, and caused them to approach as the bird stood with its feet in the water. For that reason, anglers were accustomed to make some kind of a preparation from the skin taken from the legs of a heron, a sort of heron-skin tea, and with this to prepare their bait, which they thought was rendered quite irresistible by such a proceeding.

The heron sometimes killed the falcon in its stoop by throwing its head back, whether purposely or not is not known, and receiving its enemy on the point of its sharp beak, by which the falcon was transfixed as if on a bayonet. It has been lately ascertained that the heron can swim in deep water, and does so when it sees any prey that cannot be reached by wading, such as a nice nestful of young moorhens, or a water-rat engaged at his dinner. The nest of the heron is a flat mass of sticks, laid on the highest branches of a tree, and contains five bluish-green eggs. The length of the bird is about three feet. An old name of this bird was the herne, or hernshaw, from which was derived the saying, "He does not know a hawk from a hernshaw." The last word has been corrupted into "handsaw," and of course renders the proverb most unmeaning.

The BITTERN.—The beautiful bittern has been almost banished from this country, although it was formerly a common bird. It frequents morasses and dense beds of reeds, where it lies concealed until the evening, when it leaves its rushy bed and soars to a vast height, continually uttering its sepulchral booming cry. This singular sound is not unlike the bellowing of a bull, and is most startling in its effects.

In olden times the bittern was one of the birds chiefly sought after in falconry, as the stout defence it makes against its enemies, by darting its sharp and powerful beak at them, and beating violently with its feet, renders it by no means an easy prey. For this reason, the falconer's first care, on reaching the bittern when brought to the ground by his falcon, was to secure its head, and by fixing its bill deep in the earth, to save his eyes from the rapid and well-aimed blows of the wounded bird. The falcon also was in danger of being transfixed by the sharp beak of his victim. The plumage of this beautiful bird is a rich reddish-yellow ground, boldly variegated with various black marks, which are most conspicuous in the loose, long

feathers that decorate its neck. In size it is a little less than the heron. It feeds principally on small reptiles, field-mice, and fish. Its nest is built on some slight elevation in a morass, and contains five bluish-green eggs.

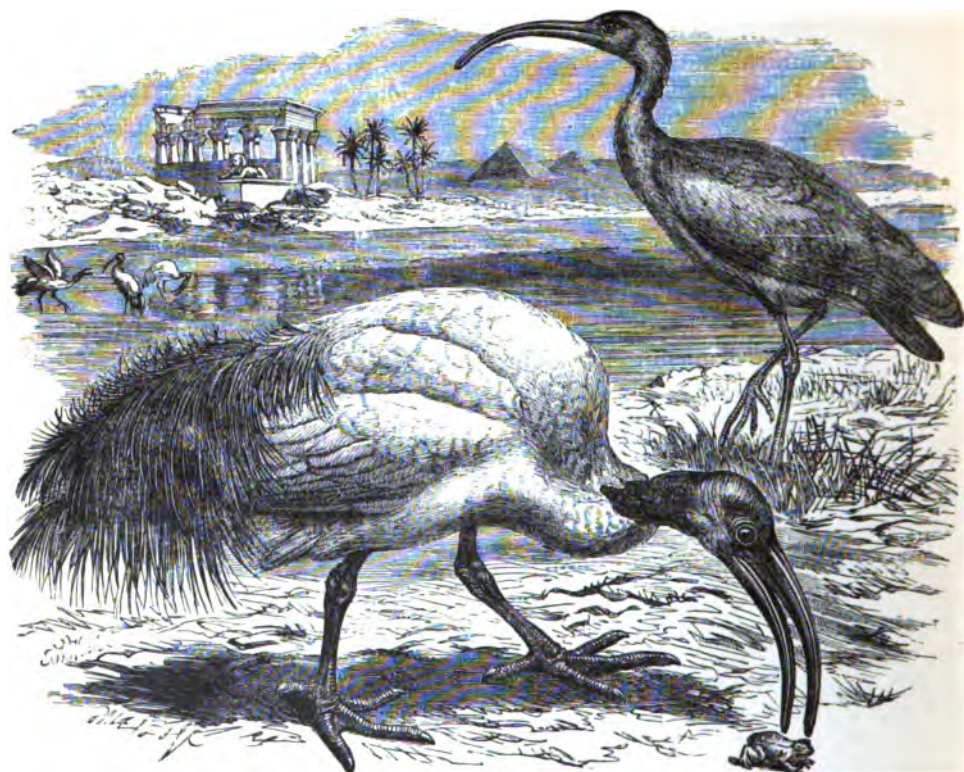
THE WHITE SPOONBILL.—The common spoonbill is found in Europe, Asia, and Africa, and frequents Holland, together with the stork. The strange shape of the tip of its beak has gained it the name of spoonbill. It has rarely been taken in this country. It feeds on worms, snails, and water plants, searching for the latter by agitating the water with its broad beak. The nest of the white spoonbill is sometimes placed in trees, and sometimes amid rushes. It contains three whitish eggs, slightly spotted with red. The length of the bird is not quite three feet.

THE STORK is extensively found throughout Europe, Asia, and Africa. In Holland storks are very abundant, and are encouraged by the Dutch to build in their towns. Among the ruins of Persepolis they are very common, scarcely one pillar being without a stork's nest at the summit. In Holland a kind of false chimney is built by the inhabitants for these birds to make their nests in. When the stork cannot find a building on which to make its nest, it chooses the flat, spreading branches of a cedar or pine, and there collects a large mass of sticks and twigs, on which it lays from three to five whitish eggs. When disturbed, the birds make a great clattering with their bills.

A recent visitor to Constantinople remarks that the very storks seemed to have become Ottoman, for they sat on the tops of the houses, looking staid and solemn, as becomes the Oriental character, and managed their beaks just as if they were pipes. It is true that they wore no turbans, but each of them appeared to have left a turban of preposterous dimensions, viz., his nest, on the roof of a house close by. The food of this bird consists of rats, mice, frogs, etc.; and it is for the benefits it confers upon man by devouring these vermin, that it is so carefully protected and encouraged, especially in the East, where the inhabitants do not trouble themselves to remove carrion or offal, but leave that office to the vultures, hyenas, and other scavengers of nature. The height of the stork is nearly four feet.

THE SACRED IBIS inhabits Egypt, but does not seem to breed there. This is the bird so frequently depicted in the hieroglyphics as playing a conspicuous part in religious ceremonies. Their mummies are constantly found in the tombs, and in one of these mummies Cuvier discovered remnants of skin, and scales of snakes. It is a migratory bird, appearing simultaneously with the rise of the Nile, and departing as the inundation subsides. The sacred ibis is about the size of an ordinary fowl. Another species, the Glossy Ibis, is also an inhabitant of Northern Africa, but is sometimes found in this country. It is probably the Black Ibis mentioned by Herodotus.

THE CURLEW, or WHAUP, is often found in the northern parts of England and Scotland, and is spread over the whole of the Old World, from South Africa to the polar regions. In winter it collects in large flocks on the muddy shores of the sea,

SACRED IBIS.—*Ibis religiosa*.GLOSSY IBIS.—*Ibis falcinellus*.

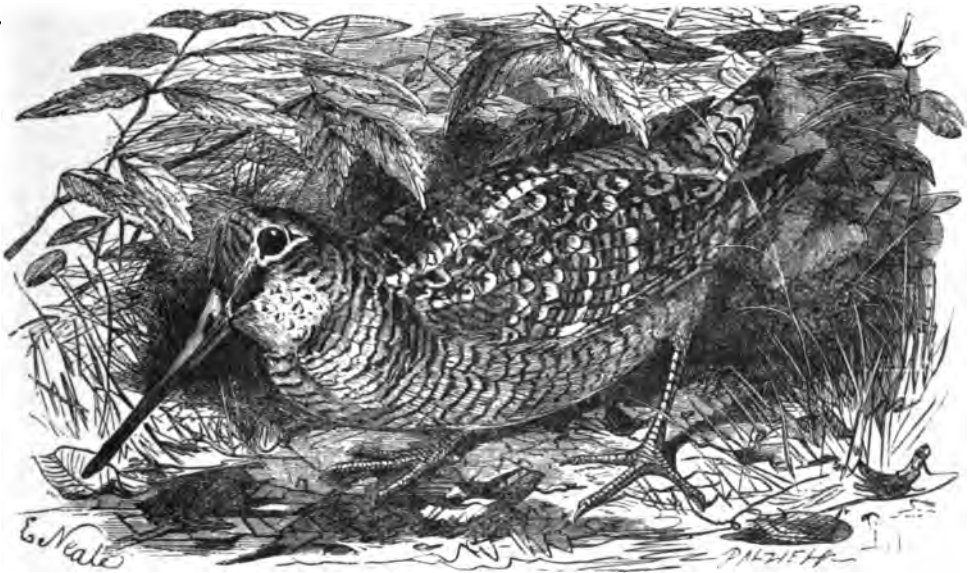
where its long, curved bill can easily penetrate in search of food. It is an exceedingly shy bird, and cannot easily be approached within gunshot. Its nest is composed of grass and rushes, collected under the shelter of a tuft of heath or grass, and contains four greenish-olive eggs blotched with brown. The length of the bird slightly exceeds two feet.

The AVOCET.—The bill in the genus *Recurvirostra* is exactly the reverse of that in the genus *Cracticornis*, the curve being upward instead of downward. The common avocet is spread throughout the warmer regions of Europe, and is also found in some parts of Africa. It is very common in Holland, and is frequently seen on the eastern coasts of England. It frequents marshes and the mouths of rivers, where it finds in the mud myriads of the small worms and insects on which it feeds, and which it obtains by scooping them up from the mud with its curiously

curved bill. It is a good swimmer, but seldom has recourse to that art except when it wades unexpectedly out of its depth.

The eggs of the avocet are laid on the ground, in a depression sheltered by a tuft of herbage. Their color is a bluish green, spotted with black. The birds when disturbed at their nests feign lameness, like the lapwing, in order to draw the intruder to a distance. The length of the bird is eighteen inches.

The Woodcock frequents dense thickets during the day, but at night it leaves these retreats, and visits the swamps and flooded meadows, where it finds a suffi-



WOODCOCK.—*Scolopax rusticola*.

ciency of worms and insects. The nest of this bird is a loose mass of grass and leaves, gathered together in some sheltered depression. The eggs are four in number, of a yellowish brown, blotched with dark brown and gray.

The SNIPE is too well known to need description. In its habits it much resembles the woodcock, excepting that it breeds plentifully in the United States. Its flight is very singular, rendering it a difficult mark.

The CORNCRAKE, or LANDRAIL, is very common in England. During the early part of the summer months its harsh cry may be heard in almost every field, but the bird itself is very seldom seen, as it threads its way among the long grass with marvellous rapidity. Its cry can be so exactly imitated by drawing a quill sharply across the teeth of a comb, that the bird may be decoyed by the sound until quite

close to the operator. The corncrake is so averse to rising on the wing, that a dog is frequently employed to hunt it. The young when taken feign death with admirable accuracy, nor do they move until they imagine that the intruder is safely out of the way. The nest of the corncrake is by no means uncommon. It is formed of hay, collected and worked into some depression in the ground, and contains from eight to twelve eggs, of a grayish yellow, covered with dark brown spots. The length of the bird is about nine inches.

The WATER-HEN, or MOOR-HEN, is very common along the reedy banks of rivers and ponds. It is very widely distributed, being found in almost all parts of the Old World. It swims very gracefully, constantly nodding its head, and dives with great skill and rapidity, particularly when alarmed, in which case it generally dives under some floating herbage, and remains there with merely its beak above the water until the danger is passed. On account of this habit, it is almost useless to shoot this bird unless the sportsman is accompanied by a dog, for if it is not shot dead it instantly dives, and nothing but a dog can discover its retreat. It runs on land with considerable activity, constantly flirting up its tail, so as to show the white feathers beneath, and when alarmed, instantly makes for the water.

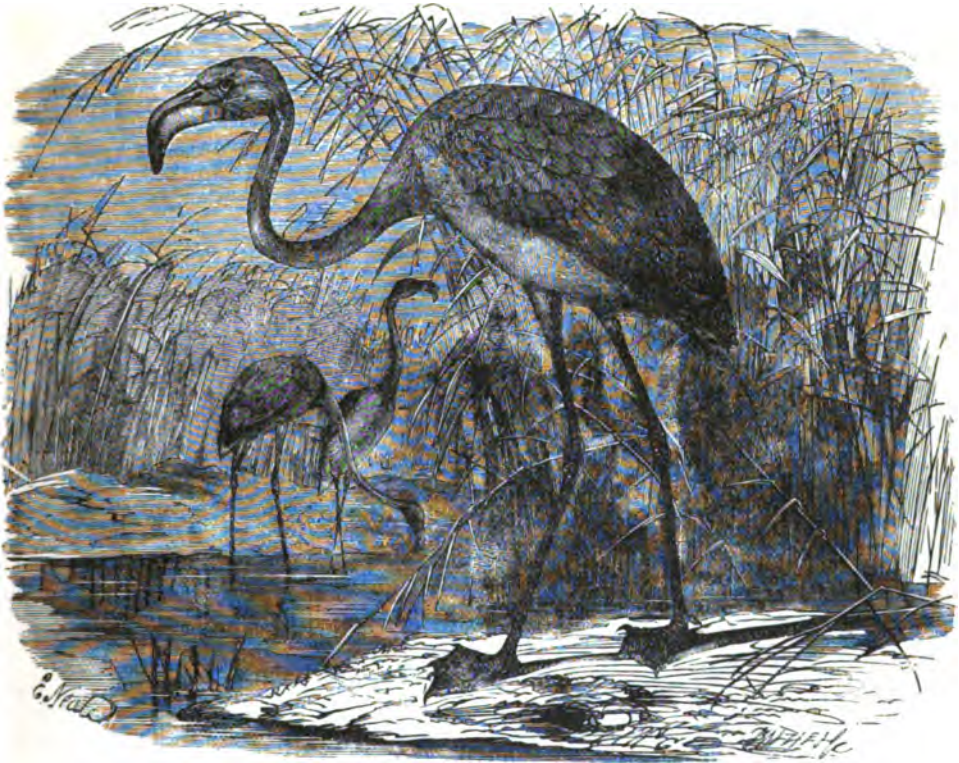
The nest of the water-hen is built among sedges and reeds at the water-side, and contains from five to eight or nine eggs, of a cream yellow spotted with dark brown. When the water-hen leaves her nest, she covers the eggs with dried grass and reeds, so as completely to conceal them, apparently lest the rats should discover them. The young when hatched look like round tufts of black down. They swim and dive well, following their parent with great address. The pike is their chief enemy, and destroys numbers by darting at them from under the cover of water-lilies or other plants.

The FLAMINGO is an inhabitant of the warmer parts of Europe, and is common in Asia and the coasts of Africa. The singularly shaped beak of this splendid bird is peculiarly adapted to its long and flexible neck. When the bird wishes to feed, it merely stoops its head to the water; the upper mandible is then lowest, and is well fitted to receive the nutritive substances which are entangled in a filter placed on the edges of the beak, much resembling the analogous apparatus of the whale.

The flamingo frequents marshes, lakes, and mouths of rivers, bidding defiance to the pestilent exhalations that drive man far from their haunts. The color of their plumage is a deep brilliant scarlet, except the quill feathers, which are black. When a number of these birds stand ranged in a line, according to their custom, they present the appearance of a small and well-drilled body of soldiers, but are far more dangerous to approach than the most formidable army, for the miasma of the marshes has a more deadly aim than the rifle, and its breath is more certainly fatal than the bullet. The nest of the flamingo is a curious conical structure of mud, with a cavity at the summit, in which are placed two or three whitish eggs. When

the female bird sits on the nest, her feet rest on the ground or hang into the water. The height of the bird is between five and six feet.

Of the TAME GOOSE, *Anser ferus*, nothing need be said, except that enormous



FLAMINGO.—*Phanicopterus ruder.*

flocks are bred, containing from two to ten thousand birds each. The birds are periodically subjected to the operation of plucking out the quill-feathers.

The MUTE or TAME SWAN, a well-known ornament to our lakes and rivers, is not an inhabitant of America, but was introduced from Eastern Europe and Asia several years back. All are familiar with the graceful deportment of this bird while sailing on the surface of the water. Unfortunately, its progress on land by no means corresponds with its aquatic grace, being confined to an awkward waddle.

The female swan makes its nest of a great mass of dry reeds, placed among osiers or rushes near the water, and lays six or eight large white eggs. During the

incubation, and while the young are still small, the parent birds defend them with great assiduity and courage. Several large swanneries are still in existence. The Crown, and the Dyers' and Vintners' Companies own the greater part of the swans in England, and their swans are annually marked on the bills by men termed swan-uppers or hoppers. The mark of the Vintners' Company is a notch or nick at each side of the bill, from which arose the term, "swans with two nicks," corrupted into "necks."

The spelling-books always say that a swan can break a man's leg with a blow of its wing. Whether they can break the leg of a man or not, I cannot say with certainty, but I have had ocular witness that they cannot break that of a boy. I have repeatedly seen a boy chase a swan into a corner, catch it by the neck, and drag it out, in spite of all the flapping of its wings.

"Like a BLACK SWAN," was formerly a well-known proverb, analogous to the Horse Marines of the present day; unfortunately for the proverb, a swan has been discovered in Australia, the whole of whose plumage is a jetty black, with the exception of the quill-feathers, which are white. It has been domesticated in this country, and may be seen in the Central Park, eagerly seeking after the crumbs offered by juvenile hands. It is rather smaller than the Whistling Swan.

The MALLARD, or WILD DUCK, is the origin of our domestic bird, and is widely spread over the northern parts of Europe, Asia, and America. In the winter it migrates in countless flocks to the warmer States. Incredible numbers of these birds are taken in a very ingenious trap, called a decoy. It is a perfect edifice of poles and nets, and is built in the form of a tube, very wide at the mouth, and very narrow at the extremity. The ducks are induced to enter the "pipe" by the antics of a dog, and by some hemp-seed previously strewn on the water. They are then driven onward to the smaller end, where they are caught and killed.

The COLYMBIDÆ are remarkable for their powers of diving. The legs are placed very far behind, and the toes are so arranged as to fold up when returning from the stroke.

The foot of the GREBES is not webbed like that of most water-birds, but each toe is separated and flattened, so as to serve as a separate paddle. The grebes dive so instantaneously that it is difficult to shoot them, as they dive at the flash, and do not reappear for nearly two hundred yards, and then they merely raise their head above water for a second, and again disappear. All the grebes feed upon fishes and the various water insects, but their stomachs are almost invariably found to contain a mass of their own feathers. This circumstance presents a singular analogy to those masses of compacted hair which are found in the stomachs of cows. In all probability the reason for their presence is the same; the feathers and hairs are accidentally conveyed to the stomach after the creature has been making its toilet.

Of the three British species of Divers, the GREAT NORTHERN DIVER is the lar-



BEWICK'S SWAN.—*Cygnus minor*.

MUTE SWAN.—*Cygnus olor*.

WHISTLING SWAN.—*Cygnus ferus*.

gest. It is generally found on the shores of the Orkneys and Shetland. This bird justly deserves its name of diver, as it can pursue fish under water with the greatest ease and certainty, and can remain under water without inconvenience for a considerable time. The nest of this bird is a very large flattened mass of dead herbage, and is placed near the water's edge, in some place where the bird imagines that the reeds and flags, among which it is laid, will guard it from discovery. But unfortunately, the bird dislikes flying, and prefers to walk to and from its nest, thereby leaving a very evident track, by which it is often discovered. The eggs are usually two in number, although three have been found in one nest. Their color is dark olive brown, sparingly marked with dark spots.

The PUFFIN is common at the Needles and the western islands of England. It forms deep burrows in the soil, in which one egg is deposited, or usurps the burrow of a rabbit. The hole is generally from three to four feet in depth, when the puffin is forced to labor for itself; it usually takes a winding course; and the inhabitant is secured from surprise by forming two entrances, in order that if one entrance is attacked, it may escape by the other. The egg is always deposited at the furthest extremity of the hole, and is not easy to be obtained, on account of the vigorous resistance made by the parent bird. It is an excellent diver, plunging fearlessly from a lofty cliff into the sea, and speedily returning with its beak full of fish, usually sprats, which are secured by their heads, and lie in a row along the bill of the puffin, forming a kind of piscatorial fringe. Its enormous and sharp-edged bill renders it a formidable antagonist to intruders. The length of the bird is thirteen inches.

It is said that the raven and the puffin have occasional conflicts, the object of dispute being generally the egg or young of the auk, for which the raven has a reat predilection. The issue of the combat depends principally on its position, each bird trying to keep to its own peculiar element. If the puffin can drag the raven over the rocks into the sea, it is speedily victorious, as it drowns its sable adversary without much trouble, but if, on the contrary, the raven can keep to shore, its superior size and strength gain the dominion.

The CAPE PENGUIN is very common at the Cape of Good Hope and the Falkland Islands. From the extraordinary sound it produces while on shore, it is called the Jackass Penguin. Darwin gives the following interesting account of this bird: "In diving its little plumelless wings are used as fins, but on the land *as front legs*. When crawling (it may be said on four legs) through the tussocks, or on the side of a grassy cliff, it moved so very quickly that it might readily have been mistaken for a quadruped. When at sea and fishing, it comes to the surface, for the purpose of breathing, with such a spring, and dives again so instantaneously, that I defy any one at first sight to be sure that it is not a fish leaping for sport."

These birds feed their young in a very singular manner. The parent bird gets, on a hillock, and apparently delivers a very impassioned speech for a few minutes,

at the end of which it lowers its head and opens its beak. The young one, who has been a patient auditor, thrusts its head into the open beak of the mother, and seems to suck its subsistence from the throat of the parent bird. Another speech is immediately made, and the same process repeated until the young is satisfied. This penguin is very courageous, but utterly destitute of the better part of courage—discretion; for it will boldly charge at a man just as Don Quixote charged the windmills, and with the same success, as a few blows from a stick are sufficient to lay a dozen birds prostrate.

The STORMY PETREL is, under the name of Mother Carey's chicken, the terror of the sailor, who always considers the bird as the precursor of a storm. It is



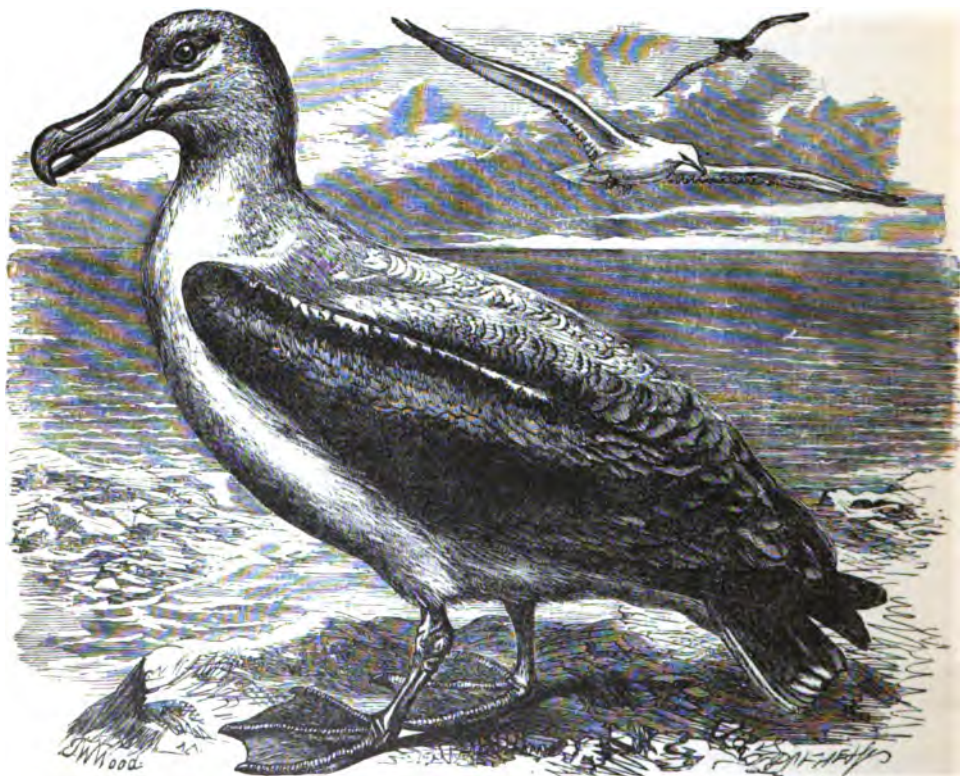
STORMY PETREL.—*Thalassidroma pelagica*.

the smallest of the web-footed birds. Few storms are violent enough to keep this curious little bird from wandering over the waves in search of the food that the disturbed water casts to the surface. Like the fulmar, the stormy petrel is so exceedingly oily in texture, that the inhabitants of the Faroe Islands draw a wick through its body and use it as a lamp.

The WANDERING ALBATROSS, the largest of the genus, is a well-known bird in the southern seas, following ships for many miles in hopes of obtaining the refuse thrown overboard. So voracious is the albatross, that it will swallow entire a fish of four or five pounds' weight. The flight of this bird is peculiarly majestic. Its extreme length of wing prevents it from rising at once from the ground, but when once launched into the air, it seems to float and direct its course without effort.

The voracity of the albatross renders it an easy prey. A hook is baited with a piece of blubber, fastened firmly to a string, and suffered to tow astern.

The bird immediately sweeps down to seize its prey, and is arrested by the hook, by means of which it is drawn into the ship. It seems rather remarkable that a bird that lives in or over the sea during its whole life, should prove a landsman when taken on board. Yet, when the albatross is caught and placed



WANDERING ALBATROSS.—*Diomedea exulans*.

on deck, it begins to stagger about, and soon becomes as thoroughly seasick as the most inexperienced passenger. The best description of the nidification of the wandering albatross is that given by Mr. Earl, quoted by Gould. Mr. Earl, after climbing a fearfully dangerous precipice in the Island of Tristan d'Acunha, arrived at a large plain of dark gray lava, on the summit of which the nests of the albatross were made. "A death-like stillness prevailed in these high regions, and to my ear our voices had a strange, unnatural echo, and I fancied our forms appeared gigantic, while the air was piercing cold. The prospect was

altogether sublime, and filled the mind with awe. The huge albatross here appeared to dread no interloper or enemy; for their young were on the ground completely uncovered, and the old ones were stalking around them. They lay but one egg, on the ground, where they make a kind of nest by scraping the earth around it; the young is entirely white, and covered with a woolly down, which is very beautiful. As we approach, they snapped their beaks with a very quick motion, making a great noise; this and the throwing up the contents of the stomach are the only means of offence and defence they seem to possess. I again visited the mountain about five months afterward, when I found the young albatrosses still sitting on their nests, and they had never moved away from them." The expanse of wing in the wandering albatross is from eleven to fourteen feet.

The SILVERY GULL is seen all along the Atlantic coast. During the winter it seeks the warmer coasts of the southern States. Its nest is composed of grass, rushes, and other materials, and contains three or four eggs, of an olive green marked with very dark brown. Neither the gulls nor the terns dive, but snatch up their prey when at or near the surface.

The TERNS or SEA-SWALLOWS are possessed of great power and endurance of flight, their long forked tails and pointed wings indicating strength and swiftness. The common tern is found in plenty along the southern shores of Europe, and in many parts of Asia and Africa. It is frequently seen on the southern shores of England, and has been found in North America. It preys on fish, which it snatches from the surface with unerring aim, as it skims over the waves with astonishing velocity. The nest of this bird is made on the sand above high-water mark, and contains two or three eggs, on which the female usually sits by night. The length of the common tern is about fourteen inches. The Noddy, so frequently celebrated by travelers who have passed the equator, is a species of tern.

The CORMORANT is found in abundance on the American coast and is widely spread over many parts of the world. It is exceedingly voracious, and devours an almost incredible amount of fish. It is an excellent diver, and chases the fish actually under the water, seldom if ever returning without having secured its prey. Like the otter when engaged in chase, it occasionally rises to take breath, and then resumes the pursuit with renewed vigor. The cormorant has the power of perching on trees, an accomplishment which we would hardly suspect a web-footed bird of possessing. Milton, in a well-known passage in his "Paradise Lost," alludes to this habit. Speaking of Satan under the disguise of the cormorant, he tells that he,

" on the tree of life,
The middle tree, and highest there that grew,
Sat."

The cormorant is easily tamed, and its fishing propensities can be turned to good account. The Chinese, at the present day, employ a kind of cormorant for

that purpose, having previously placed a ring round the bird's neck, to prevent it from swallowing the fish. The eggs of this bird are usually laid on the rock, but sometimes in the branches of trees. A thick coat of chalk envelops the eggs, and can be easily scraped off with a knife. The length of the bird is about three feet.

The WHITE PELICAN inhabits Africa, India, a great part of the south eastern portions of Europe and the United States. It is a very conspicuous bird, its singular membranous pouch offering a distinction perfectly unmistakable. The pouch, when distended, holds two gallons of water, but the bird has the power of contract-



PELICAN.—*Pelicanus onocrotalus*.

ing it so that it is scarcely to be discerned. The pouch also serves as a net in which to scoop up the fish on which the pelican feeds. Another most important use of the pouch is to convey the food to the young. The parent pelican presses the pouch against its breast, in order to enable the young to obtain the fish; which action, in

all probability, gave rise to the fable of the pelican feeding its young with its own blood. The red tip of the bill probably aided the deception. The flesh of the pelican is eaten by negroes and Indians, but it has a strong fishy taste, and is very tough. The pelican is the emblem of the State of Louisiana, and is represented on the State seal as sitting on its nest feeding its young.

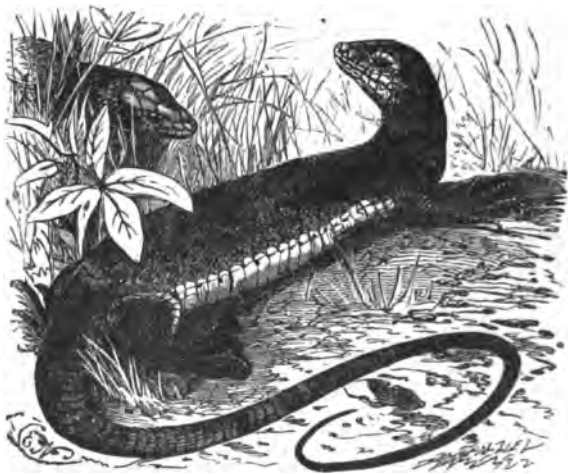
Although a web-footed bird, the pelican, like the cormorant, can perch on trees, although it prefers sitting on rocks. The color of this bird is a pure white, with a very slight tinge of rose-color, and the pouch is yellow. The length of the bird is nearly six feet.

REPTILES.

We now arrive at the singular class of REPTILES. The animals of this class vary exceedingly in their forms, sizes, and habits, but the peculiar formation of the circulatory system, together with many other anatomical distinctions, plainly mark them out as a distinct class.

The LIZARDS are usually active, bright-eyed little creatures, delighting to bask in the sun, near some safe retreat, to which they dart with astonishing celerity upon the slightest alarm.

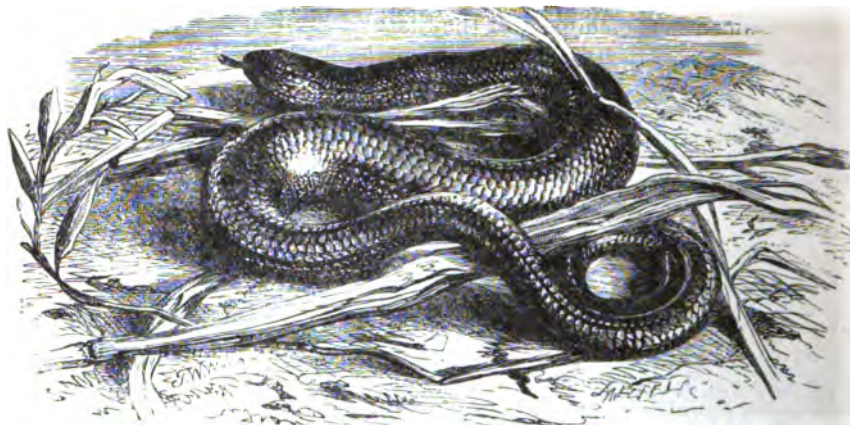
Two species of lizards inhabit this country, the common lizard and the sand lizard. The latter animal is considerably larger than the common lizard, as it sometimes measures a foot in length. It frequents sandy heaths, and in the sand its eggs are deposited, fourteen or fifteen in number. The eggs are hatched by the heat of the sun, and the young immediately lead an independent life. During the winter this as well as the common lizard hibernates in a burrow usually made under the roots of a tree, nor does it again make its appearance until the spring.



SAND LIZARD.—*Lacerta agilis*.

The common lizard is only six inches in length. It is more active than the sand lizard, disappearing like magic on being alarmed. When seized, its tail frequently snaps off like glass. Both lizards feed on insects.

The BLIND-WORM is not a snake, as generally supposed, but a legless lizard of the Skink family. It is perfectly harmless; its small mouth and very minute



BLIND-WORM.—*Anguis fragilis*.

teeth precluding all attempts to injure, even if it had the will. When alarmed, it snaps asunder at the slightest blow, like the tail of the common lizard, and from that peculiarity has derived its name of "fragilis." It feeds almost entirely on small slugs, its jaws not being capable of admitting any larger prey. It is very common in most parts of America, and may be seen basking in the sun in hedgerows or under old walls. Its eyes are very small, but brilliant.

The IGUANA family is a very large one, containing 150 species. The common iguana is a native of Brazil, Cayenne, Jamaica, etc. In spite of its repulsive appearance, it is with many people a favorite article of food, and is said somewhat to resemble chicken. It is very fierce when attacked, and snaps at its enemies in a most determined manner, often scaring away an intruder by the ferocity of its aspect. It is generally taken by throwing a noose over its head, and dragging it from the branches by main force. It is then immediately killed, as its sharp notched teeth can inflict a very disagreeable wound. Sometimes it is hunted with dogs trained to the sport. It attains a considerable size, frequently reaching the length of six feet. It feeds usually on vegetable substances, such as leaves, fruit, and fungi; but iguanas have been seen in the Island of Isabella that feed on eggs, insects, and even the intestines of fowls. An enormous fossil iguana has been discovered by Dr. Mantell, whose length must have been nearly seven feet.

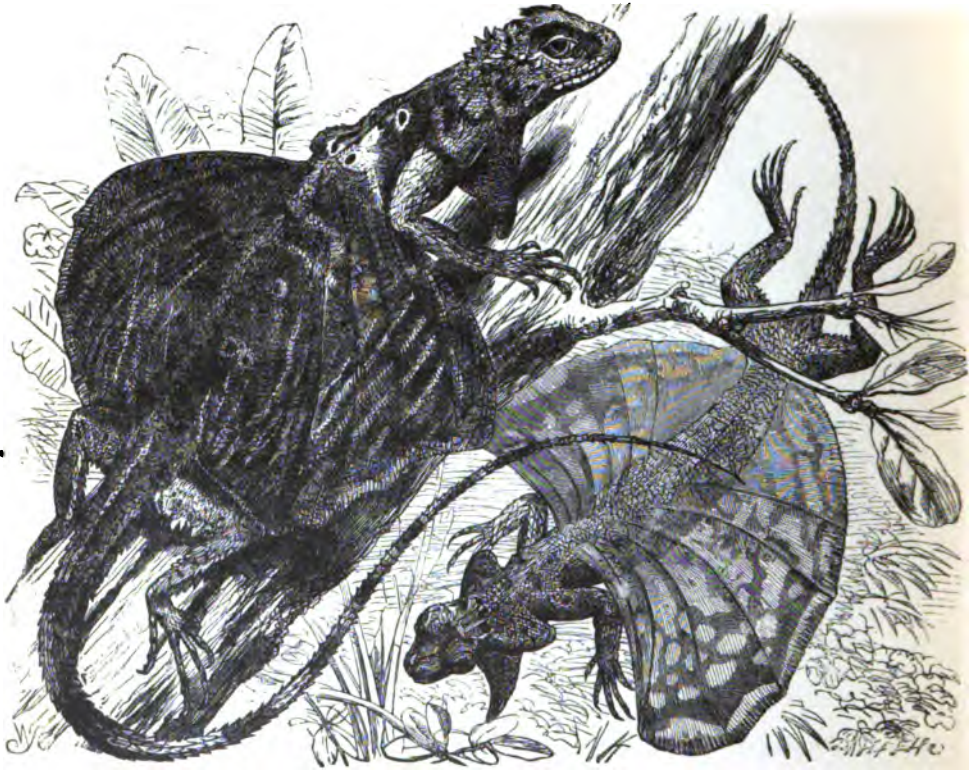
The terrible name of FLYING DRAGON belongs to a harmless little lizard, bearing small resemblance to the terrific animal so graphically depicted by Retsch. This curious little lizard lives on trees, and feeds on insects instead of devouring



IGUANA.—*Iguana tuberculata*.

NAKED-NECKED IGUANA.—*Iguana delicatissima*.

pilgrims bound to the Gnadenbilde. The peculiar structure of its body bears a singular resemblance to that of the flying squirrel. The first six false ribs are greatly elongated, and support a wing-like expansion of skin, which when stretched serves

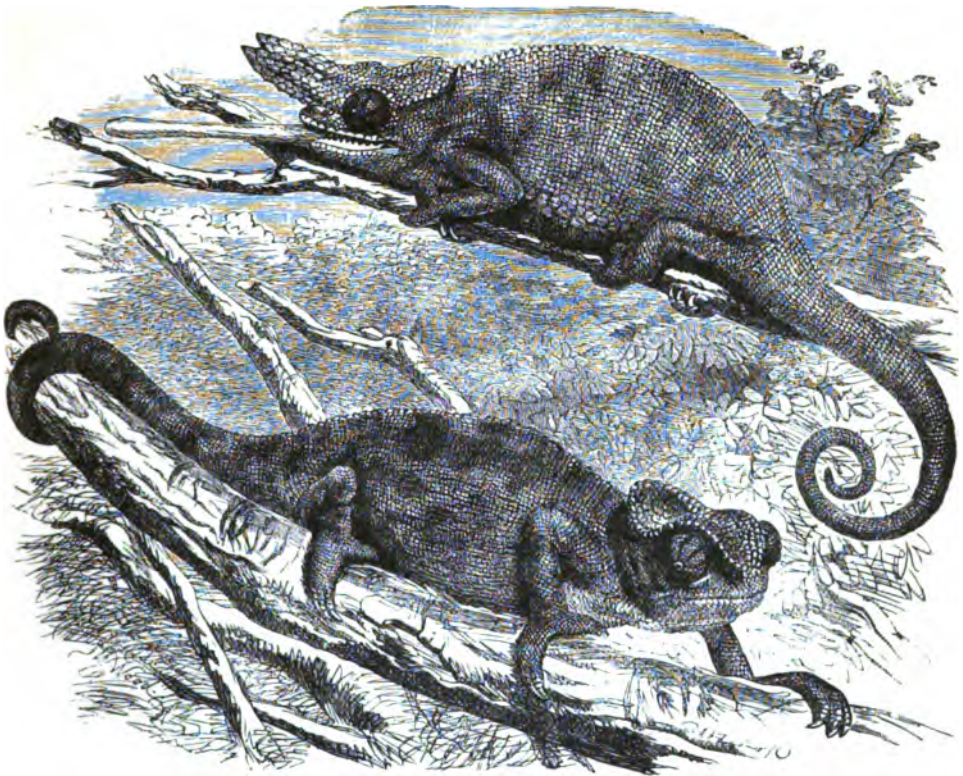


FRINGED DRAGON.—*Draco fimbriatus*.

FLYING DRAGON.—*Draco volans*.

to bear them up as they skim through the air from one tree to another. While running about on the branches, the so-called wings are folded to the side, but when it wishes to throw itself from the tree, the ribs are raised, and the wings expanded. It is common in Java, India, and Borneo.

The COMMON CHAMELEON is plentifully found in northern Africa, the south of Spain, and Sicily. It lives on trees, but exhibits none of the activity usually found in arboreal reptiles. On the contrary, its movements are absurdly grave and solemn. The whole activity of the animal seems to be centred in its tongue, by means of which organ it secures flies and other insects with such marvellous rapidity that

CHAMELEON.—*Chameleo vulgaris*.LARGE-NAPED CHAMELEON.—*Chameleo bifurcus*.

the ancients may well be pardoned for their assertion that the air formed the only food of the chameleon. Highly exaggerated descriptions have been given of the changes of color in this animal. The changes are by no means so complete, nor are the colors so bright, as generally supposed.

“ And then its hue,
Who ever saw so fine a blue ?”

The poetic moralist further recounts its changes to green, black, and *white*. The umpire referred to in the poem is recorded to have asserted,

“ If you don't find him black, I'll eat him ;”

but every one who has watched a chameleon for any time, will be equally ready to eat him the moment that he turns white. The power of the chameleon to move its eyes in different directions at the same time gives it a most singular aspect. Its

enormously long tongue can be withdrawn into the mouth when not in use; but when the creature sees a fly within reach, the tongue is instantly darted forth, and by means of a gummy secretion at the tip secures the fly. The whole movement is so quick as almost to elude the eye.

The peculiar gliding movements of the SNAKES render them excellent types of the reptiles; a word derived from the Latin *repto*, I creep. The extraordinary flexibility of their bodies is caused by the structure of their vertebræ, each one of which fits into the one behind it by a ball-and-socket joint, thus allowing freedom of motion in every direction.

The RATTLESNAKE is a native of America. Its name is derived from the loose bony structure at the extremity of its tail, called the rattle, and which by the sound of its movements gives timely intimation of the vicinity of this terrible reptile. Fortunately, its disposition is exceedingly sluggish, and it invariably sounds its



RATTLESNAKE.—*Uropophis durissus*.

rattle when irritated or disturbed. Its bite is inevitably mortal, and death always ensues within a few hours after the wound has been inflicted.

The deadly weapons with which the venomous serpents are armed are two long curved fangs belonging to the upper jaw, and moving on a hinge, by which they lie flat in the mouth when not wanted. An aperture exists in the point of the fang, by which a poisonous fluid, secreted in a gland at the base of the tooth, is poured into the wound, and, mixing with the blood, rapidly carries its deadly influence throughout the entire system. A short time since an American physician was exhibiting a caged rattlesnake to his friends; he approached his hand too near the irritated reptile, who instantaneously inflicted a wound; and, although every precaution was taken, the bite proved fatal in a few hours.

The inhabitants of those countries where the rattlesnake lives are not very much afraid of it, as they know that it will be sure to run away directly it hears the approach of human footsteps. It appears that when a man is cutting wood or otherwise engaged in a forest, and hears a rattlesnake near him, he has no fear, as long as he can keep its rattle going, but directly the sound ceases, the man is rather in dread, not knowing where the animal may turn up next; so he keeps the snake in a constant state of alarm, by throwing bits of wood or sticks at the place where the reptile is lying, and on again hearing the sound of the rattle, he continues his work in confidence, until the snake is silent, when some more missiles are sent in the same direction.

An American traveller told me that, even when these snakes are ready for a spring, they can be avoided by smartly clapping the hands together, or striking the ground with a stick. The snake has the whole powers of its mind bent upon its fatal stroke, and, on hearing such an unexpected sound, it is startled, like a man suddenly waked from sleep, and falls down in its coil again, giving time for its intended victim to escape before it has made up its mind to another assault. The length of this snake has seldom been known to exceed seven feet.

The PUFF ADDER is an inhabitant of Southern Africa. It is a short, thick, somewhat flat snake, of a most sinister and malignant aspect. The following alarming adventure occurred to Mr. Cole, a resident in the Cape: "I was going quietly to bed one evening, wearied by a long day's hunting, when, close to my feet and by my bedside, some glittering substance caught my eye. I stooped to pick it up; but, ere my hand had quite reached it, the truth flashed across me—it was a snake! Had I followed my first natural impulse, I should have sprung away, but not being able clearly to see in what position the reptile was lying, or which way his head was pointed, I controlled myself, and remained rooted breathless to the spot. Straining my eyes, but moving not an inch, I at length clearly distinguished a huge puff adder, the most deadly snake in the colony, whose bite would have sent me to the other world in an hour or two. I watched him in silent horror; his head was from me; so much the worse—for this snake, unlike any other, always

risers and strikes back. He did not move; he was asleep. Not daring to shuffle my feet, lest he should awake and spring upon me, I took a jump backward, that would have done honor to a gymnastic master, and thus darted outside the door of the room; with a thick stick I then returned and settled his worship."

The same author remarks in his "Five Years' Residence in South Africa," that its (the puff adder's) bite will kill occasionally within an hour. It is more dangerous, because it has a way of flattening itself upon the ground; so that, when it is lying thus concealed upon the sand, an incautious pedestrian is very likely to tread upon it.

The COMMON VIPER, or ADDER, is the only venomous reptile inhabiting England, nor is its bite nearly so dangerous in its consequences as has been reported. Seldom has the bite of the viper proved mortal; and in all probability, had proper precautions been taken, no case would have been fatal. Viper-catchers employ olive oil as a remedy against the bite, and, from all accounts, it appears to be a certain preservative against all evil effects. The oil should be heated to produce its full efficacy.

It is asserted that, when danger threatens, the female viper opens her mouth and permits her brood to hide themselves, but it is by no means an ascertained fact. Frogs, lizards, mice, and other small animals, form the food of this reptile, but sometimes it falls a victim to its own voracity. In the "Magazine of Natural History, a viper is mentioned which had swallowed a lizard nearly as large as itself, and one of whose legs was protruding from its side. In former times, preparations from vipers, and especially viper-broth, were in great request as medicines.

The BOA-CONSTRUCTOR.—The enormous boa-constructor inhabits tropical America. It is not venomous, but it is not the less dangerous, as the tremendous power of its muscles enables it to crush its prey in the coils of its huge body. In order to procure its food, the boa-constructor lies in wait by the side of some river or pool, where animals of all kinds are likely to come to quench their thirst. It patiently waits until some animal draws within reach, when, with one spring, the boa fixes its teeth in the creature's head, coils its body round its victim, and crushes it to death. After the unfortunate animal has been reduced almost to a shapeless mass by the pressure of the snake, its destroyer makes preparations for swallowing it entire, a task which it accomplishes, although the slaughtered animal is usually very much larger than the dimensions of the serpent. At last the snake succeeds in swallowing its prey, and then lies torpid for nearly a month, until its enormous meal is digested, when it again sallies forth in search of another. Even the buffalo has been known to fall a victim to this fearful serpent, whose length frequently exceeds twenty-five feet.

The COBRA DE CAPELLO is a native of India. It must not be confounded with several other hooded snakes, such as the haje of Egypt, the snake so frequently depicted on hieroglyphical monuments.

The serpent-charmers invariably use this formidable reptile for their performances. The exhibitors possess several cobras shut up in baskets, and when commencing their performances, the lid of the basket is opened, and the snake creeps out. Its course is arrested by the sound of the rude fife that the charmer always carries, and it immediately expands its beautiful though threatening hood, erects its neck, and commences a series of undulating movements, which are continued until the sound of the fife ceases, when the snake instantly drops, and is replaced in its basket by its master. The charmers appear to be able to discover snakes, and to induce them to leave their retreat. Indeed it is rather a singular fact that those travellers who most strongly insist that the snakes thus caught are tame and divested of their fangs, appear to forget that even in that case the creatures must have been previously caught in order to deprive them of their weapons. The length of this snake is about five or six feet.

The COMMON RINGED or GRASS SNAKE is a harmless inhabitant of this country, and may frequently be seen or heard gliding along the hedge-banks in search of food. It is easily tamed, and soon learns to know its master. It lives principally on frogs, mice, young birds, newts, etc. It is an excellent swimmer, and from the peculiar construction of its lungs, can remain under water for some time. It seems very fond of water, and is most commonly found on marshy land, or in hedges planted over a wet ditch. The viper, on the contrary, prefers dry, sandy situations.

Several snakes kept tame at a village in Wiltshire were fed with frogs and small newts, which latter animals the snake was induced to swallow, by the simple process of opening the snake's mouth, and pushing the newt down its throat. This plan, although apparently rather rude, appeared to cause the snakes no inconvenience. Like all other serpents, the ringed snake sheds its skin several times during the year. The entire skin comes off, even the covering of the eyes. A rent opens in the neck, and the snake, by entangling itself in the thick grass or bushes, actually creeps out of its skin, turning it inside out in the effort.

The TORTOISE.—The whole of this order is characterized by the complete suit of bony armor with which the animals are protected. The so-called "shell" is in fact a development of various bones, and not a mere horny appendage, like the coverings of the armadillo and manis.

The upper shield is called the "carapace," and is united to the under shield or "plastron" by certain bones, leaving orifices for the protrusion of the head and limbs. Most species are able to withdraw their head and limbs completely within the shell, and in some few the orifices are closed by a kind of hinge joint. The tortoise-shell of commerce is a series of horny plates that cover the exterior of the shield, and is in great request, on account of the beautiful wavy markings that are so familiar to our eyes.

The tortoises and turtles possess no teeth, but the sides of their jaws are very

hard and sharp, enabling them to crop vegetable substances, or to inflict a severe bite. The family is divided into Land Tortoises, Marsh Tortoises, River Tortoises, and Marine Tortoises, or Turtles.

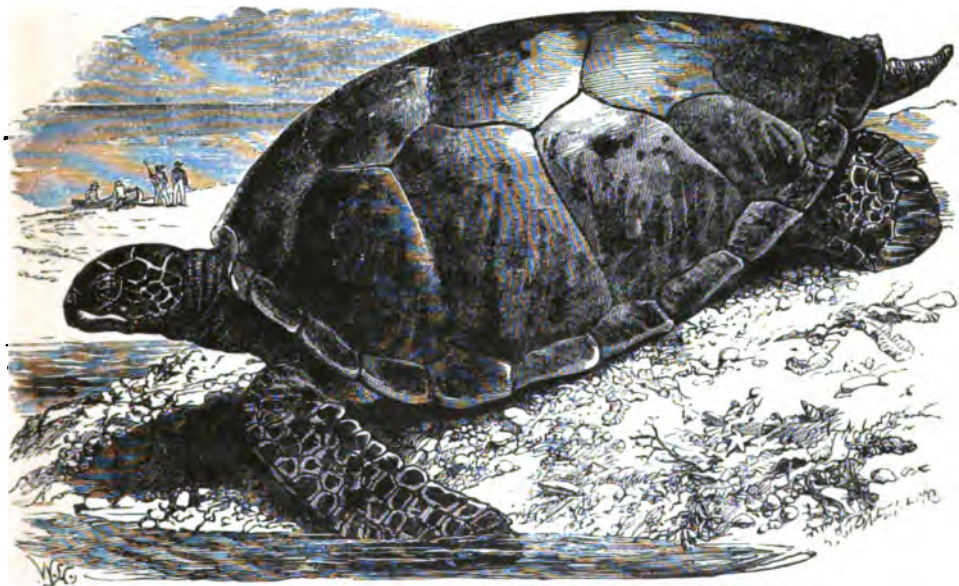
The COMMON LAND TORTOISE is found in abundance in the south of Europe. It is often kept in captivity in this country, and is very long-lived, individuals being known to have exceeded two hundred years. Its movements are very slow, but it can excavate a burrow with unexpected rapidity. Secure in an impenetrable covering it bids defiance to any ordinary enemy, except, as Sidney Smith wittily observes, "man, and the boa-constrictor. Man, however, takes him home and roasts him, and the boa-constrictor swallows him whole, shell and all, and consumes him slowly in the interior, as the Court of Chancery does a great estate."

I had a common land tortoise for a few months, part of whose life is described in the following passage, which has already appeared as a note to White's "Natural History of Selborne." Some time since, a man arrived in town, bringing with him tortoises for sale. They passed their existence in a basket, where they were packed close, like so many bricks, standing on their tails, and their heads looking out of the basket. When I purchased one of them, the man emptied out his whole basketful upon the table, and then turned out the contents of four large pockets, until a large table was entirely covered with them.

The tortoise which I purchased was a very small one, and was tolerably lively, walking about the room, and always settling on the hearth-rug. It had a great genius for climbing, and would sometimes spend nearly an hour in endeavoring to scale the fender, probably attracted by the heat. Unfit as the form of the creature may seem for such a purpose, it did contrive to scramble upon a footstool which was placed by the fender. Its method of attaining this elevation was as follows: First it reared up against the footstool in the angle formed by it and the fender, and after several ineffectual attempts, succeeded in hitching the claws of one of its hind feet into the open work of the fender. On this it raised itself, and held on to the top of the stool by its fore feet, while it gained another step on the fender, and so managed to raise itself to such a height, that it only had to fall flat on the top of the footstool. When once there, it could hardly be induced to leave the elevation which it had gained with such difficulty.

Its food consisted of bread and milk, which it ate several times a day, drinking the milk by scooping up some of it in its lower jaw, and then, by throwing its head back, the milk ran down its throat. Tortoises are generally long-lived, but this animal died within a few months after it came into my possession, in all probability because, for some days, its food was placed in a brass vessel. Several days before its death it was very restless, and went about the room mewling like a young kitten, and made such a noise that it had to be ejected during working hours. I could not for some time believe that the mewling could proceed from the tortoise, as the resemblance to that of a kitten was most exact.

The COMMON GREEN TURTLE.—The feet of the marine tortoises, or turtles, are modified into fins or flippers, just as are the feet of the seals, and consequently, although the turtles are active in the water, on land their walk is nothing but an awkward shuffle. The flippers, however, are admirable instruments for scooping out the sand, in which the eggs are laid, and afterward covered over. Nearly two hundred eggs are laid in one nest. The eggs are held in great estimation, but the albumen, or "white," does not become hard by boiling.

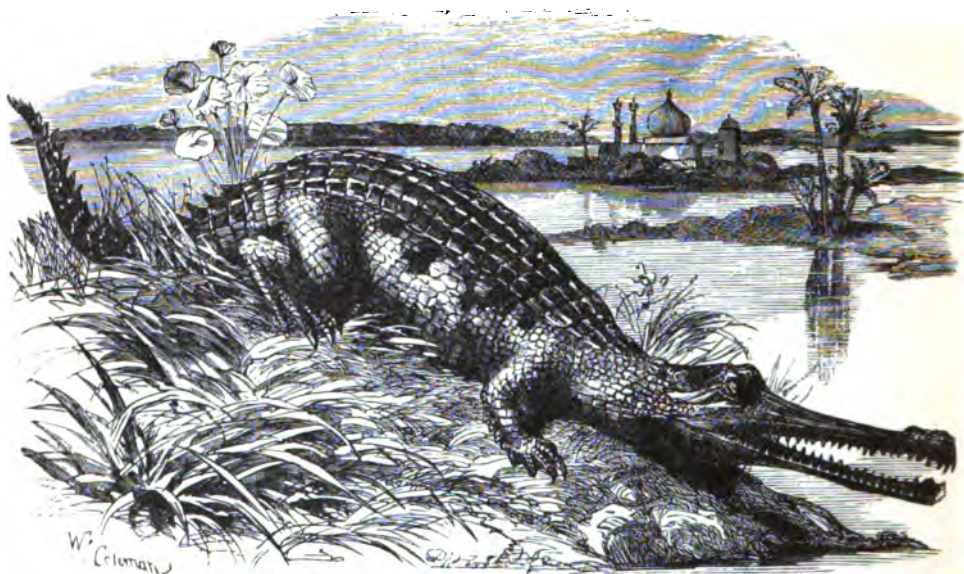


GREEN TURTLE.—*Chelonia viridis*.

The green turtle, which is named from its green fat, from which turtle soup is made, is common in Jamaica, and most of the islands of the East and West Indies. The turtles are captured by turning them on their backs; for the carapace is so flat, and their legs are so short, that they are forced to lie helpless until their captors have leisure to drag them away. The green turtle has been known to reach the weight of five or six hundred pounds. The tortoise-shell of commerce is almost entirely obtained from the hawksbill turtle.

The CROCODILE.—These animals are separated from the lizards on account of the peculiar horny covering with which they are protected.

The crocodile is an inhabitant of the Old World, the alligator of the New, and the two animals are best distinguished by the construction of the jaws. In the crocodiles the lower canine teeth fit into a *notch* in the edge of the upper jaw, and



GAVAL, OR GANGETIC CROCODILE.—*Gavialis Gangeticus*.

there is in consequence a contraction of the muzzle just behind the nostrils. The lower canine teeth of the alligators fit into a *pit* in the edge of the upper jaw, and in consequence no contraction is needed. At the back of the throat is a valve completely shutting out water, but leaving the passage to the nostrils free, so that the crocodile can keep his mouth open when beneath the surface, without swallowing the water, or can hold his prey to drown under the water, while he breathes at ease with his nostrils at the surface. There is no true tongue. The common crocodile inhabits many African rivers, and is, probably, the reptile infesting the Ganges. The Nile, however, is the best known haunt of this terrible creature.

The crocodile feeds on fish, floating carrion, and dogs, or other animals, which it is enabled to surprise as they come to drink at the water's edge, but man frequently falls a victim to its voracity. In revenge for this treatment, all nations persecuted with this pest have devised various methods of killing it. The negroes of some parts of Africa are sufficiently bold and skilful to attack the crocodile in his own element. They fearlessly plunge into the water, and diving beneath the crocodile, plunge the dagger with which they are armed into the creature's belly, which is not protected by the coat of mail that guards the other parts of its body. The usual plan is to lie in wait near the spot where the crocodile is accustomed to repose. This is usually a sandy bank, and the hunter digs a hole in the sand, and

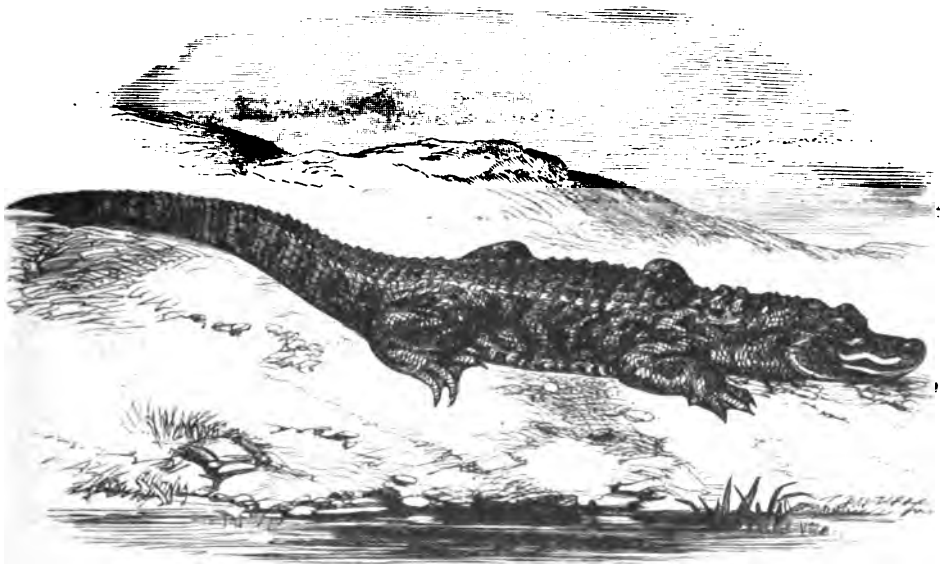


CROCODILE AND PREY.

armed with a sharp harpoon, patiently awaits the coming of his expected prey. The crocodile comes to its accustomed spot, and is soon asleep, when it is suddenly roused by the harpoon, which penetrates completely through its scaly covering. The hunter immediately retreats to a canoe, and hauls at the line attached to the harpoon until he drags the crocodile to the surface, when he darts a second harpoon. The struggling animal is soon wearied out, dragged to shore, and dispatched by dividing the spinal cord. In order to prevent the infuriated reptile from biting the cord asunder, it is composed of about thirty small lines, not twisted, but only bound together at intervals of two feet.

When on land it is not difficult to escape the crocodile, as certain projections on the vertebræ of the neck prevent it from turning its head to any great extent. The eggs of this creature are very small, hardly exceeding those of a goose; numbers are annually destroyed by birds of prey and quadrupeds, especially the ichneumon.

THE ALLIGATOR, or CAYMAN, is an inhabitant of America, and is unpleasantly common in the rivers of our Southern States. It pursues fish with exceeding dexterity, by driving a shoal of them into a creek, and then plunging amid the terrified mass, and devouring its victims at its pleasure. It also catches pigs, dogs, and other animals that venture too close to the river. In that case, as the animal is too large to be swallowed entire, the alligator conceals it in some hole in the bank un-

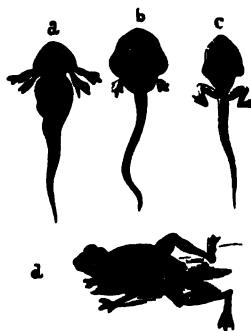


THE ALLIGATOR.—*Alligator Mississippiensis.*

til it begins to putrefy, when it is dragged out, and devoured under the concealment of the rank herbage fringing the river.

The usual method of taking this creature is by baiting a most formidable four-pointed hook, composed of wooden spikes, artistically arranged, and suffering it to float in the river. When an alligator has swallowed it, he is hauled on shore by the rope, and slaughtered. Like the crocodile, the alligator lays its eggs in the sandy bank of the river. Fortunately, but few of the young ever reach maturity, as their ranks are thinned by various birds and beasts of prey before the eggs are hatched, and by the attacks of large fishes, and even their own species, when they have reached the water.

The FROG.—The appearance and habits of the frog and the toad are so familiar as to require but little description. A short account, however, is necessary of the peculiarities common to both frogs and toads.



TADPOLES.

In the early stage of their existence, these animals are termed tadpoles. They at first appear to be nothing but head and tail, but after several days have passed, four legs are observed to become developed. These rapidly increase, and the little creature closely resembles a small eel. In due time, however, the tail is lost, and the creature becomes a perfect frog. Another important change also takes place. In its tadpole state the creature was essentially a water animal, but after its change has taken place it is not able to exist under water for any great length of time, and is forced to come to the surface to breathe. The tongue of the frog is curiously fixed almost at the entrance of the mouth, and when at rest points backward down the throat. When, however, the frog comes within reach of a slug or insect,

the tongue is darted out with exceeding rapidity, the slug secured, carried to the back of the throat, and swallowed.

Both frogs and toads hibernate, the former congregating in multitudes in the mud at the bottom of ponds and marshes, while the latter choose a hole in the ground, frequently at a root of a tree, and pass the winter in solitary dignity. In February, two frogs were dug out of the gravelled play-ground of Magdalen School. They were about a foot from the surface of the ground, and their habitation was quite smooth. Both were sitting with their mouths pointed upward, but I could not ascertain if there had been any communication with the open air. The skin of these animals has a property of imbibing water, so that if an apparently emaciated frog is placed in a damp place, it will soon look quite plump.

The Common Frog is a well-known frequenter of marshy places and the banks of rivers. It is an admirable swimmer, and from the peculiar construction of its lungs can remain for some time under water, but is forced periodically to come to

the surface for the purpose of breathing. The Bull-Frog is an inhabitant of North America. It is very voracious, feeding upon fishes, molluscs, and even young fowl. Its powers of leaping are so great, that an Indian was not able to overtake an irritated bull-frog after it had sprung three hops in advance. It is very large, measuring about seven inches in length.

The Tree Frogs are very peculiar animals. The construction of their feet, somewhat resembling that of the geckos, enables them to traverse the branches, and even to hang on the under surface of the pendent leaf, which it so resembles in color that the unwary insect passes by and is instantly seized by the watchful frog. The Green Tree Frog is the most common, and is plentifully found in southern Europe and northern Africa. There are several specimens in the Zoological Gardens, which present a most absurd appearance as they stick against the pane of glass forming the front of their cage.

The COMMON TOAD has had its full share of marvellous tales. Its poisonous properties are celebrated in many an ancient chronicle, as are also the virtues of the jewel contained in its head. Its skin certainly does secrete an acrid humor, which at all events defends it from dogs, who can seldom be induced to bite a toad a second time; but of course such absurd notions as the romantic story of a young lady and her lover, who died in consequence of eating a leaf of a shrub at the root of which a toad had made its habitation, need no refutation.

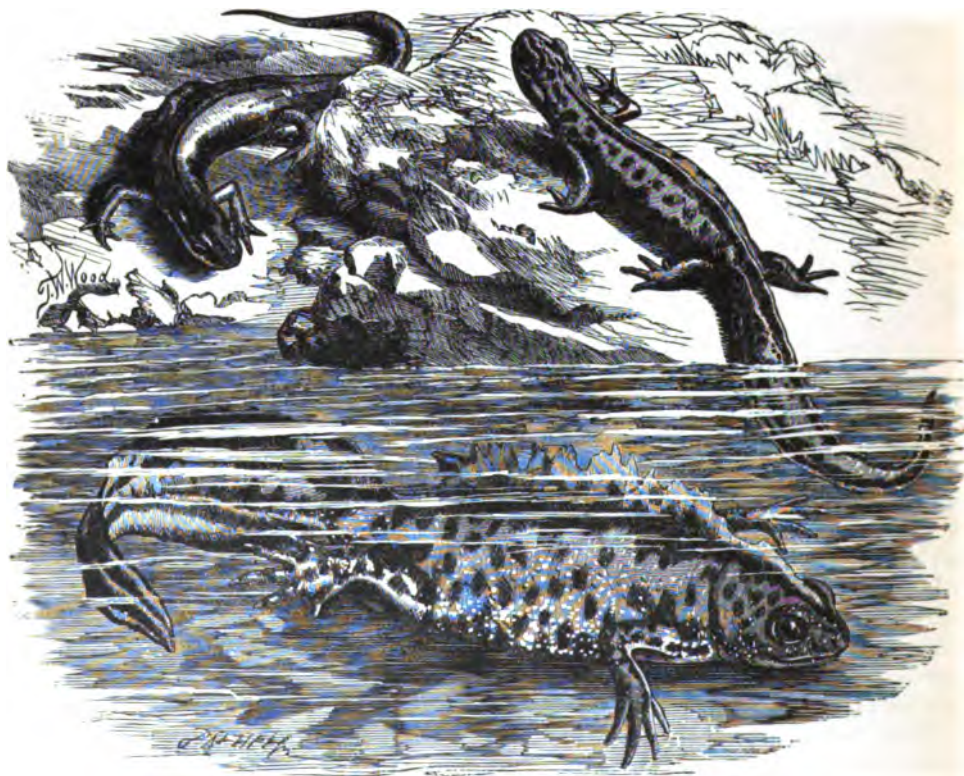
The toad is easily tamed. A correspondent from the country has kindly sent an account of a tame frog that had lived in the family for several years, and which was accustomed to sup on a lump of sugar. The well-known instances of imprisoned toads, who must have spent many years in their narrow habitation, are apparently explained by the supposition that some aperture or fissure existed, through which air and minute insects could pass, sufficient for their nourishment while in a semi-torpid condition. Certainly those experimented on by Dr. Buckland in 1865, and from whom all air was cut off, died before a year's imprisonment. The toad casts its skin at certain times, but we never find the slough as we do that of the snake, as the toad invariably swallows its former covering.

The NEWTS are separated from the lizards on account of their changes while young. Like the frogs, they are first tadpoles, and do not assume their perfect shape until six weeks after their exclusion from the eggs.

The Common Newt is a beautiful inhabitant of the ponds, ditches, and still waters. It feeds principally on tadpoles and worms, which it eats with a peculiar rapid snap. I have frequently seen it attack the smaller newt with great perseverance, but I was never fortunate enough to see it kill its prey. I kept some newts for some time in a large glass vessel, and noticed that when a new inhabitant was added, it always cast its skin within two or three days. The skin came off in pieces, the covering of the feet slipping off like a glove; but I could never see how the creature contrived to pull these glove-like relics

off. It is constantly in the habit of rising to the surface of the water in order to breathe.

- Many country people have a great horror of these beautiful and harmless little animals. In a little village in Wiltshire there is a current anecdote of a girl who was bitten in the arm by an *effet*, who spit fire into the wound. The girl con-



CRESTED NEWT.—*Triton cristatus*.

SMOOTH NEWT.—*Lophinus punctatus*.

sequently lost her arm. Some of these newts or efts were placed in a trough where the cows were accustomed to drink. After a few days a calf died, and nothing would convince the rustics that the effets were not the cause of the untimely decease of the calf, although it had never come near the trough, but was safely fastened in the cow-house. The newt has received the name of Christatus, or crested, on account of the beautiful crimson-tipped wavy crest of loose skin that extends along the whole course of the back and tail, and which, together with a rich orange-colored

belly, makes it a most beautiful creature. The female has a singular habit of laying her eggs upon long leaves of water-plants, and actually tying them in the leaf by a regular knot.

The PROTEUS is an extraordinary animal, which has been found in dark subterranean lakes, many hundred feet below the surface of the earth, where no rays of light can possibly enter. The eyes of this singular creature are mere points covered with skin, and useless for vision ; indeed, when in captivity it always chooses the darkest parts of the vessel in which it is confined.

I have seen seven specimens of this strange creature which have lived for several years in a glass vessel covered with green baize in order to keep them in the dark. They have not been known to take any nourishment whatever during the time of their captivity, except the very trifling amount of nutrition that might have been obtained by changing the water.

The proteus breathes in two ways—by lungs and by gills, the latter organs appearing in the form of two tufts, one on each side of the neck, just above the fore limbs. The circulation of the blood in these branchial tufts can easily be seen with a microscope of moderate power. These tufts are of a rather deeper pink tinge than the remainder of the body, which is of a very pale flesh-color. Exposure to light darkens the tints both of gills and body. It bears some resemblance to the young of the newts, which are furnished with branchial tufts, which they lose upon attaining maturity, and was therefore for some time thought to be the young of some unknown reptile. It has, however, been proved to be a perfect animal, and has been found of all sizes.

The blood-disks of this animal are exceedingly large ; so large, indeed, as almost to be distinguished by the naked eye. When in captivity, its movements are slow and eel-like, nor does it seem to make much use of its almost rudimentary limbs. It has usually been found on the soft mud of a small lake in the grotto of Maddalena. It is not always present, and has been conjectured to be the inhabitant of some unknown subterranean body of water, and to have been forced through the crevices of the rocks. Besides the grotto of Maddalena at Adelsburg, they have also been found at Sittich, thirty miles distant, thrown up from a subterranean cavity.

FISHES.

As the FISHES live exclusively in the water, it is necessary that their organs of respiration should be differently formed from those of the animals breathing atmospheric air. Instead of the purification of the blood being accomplished by the contact of atmospheric air in the apparatus called lungs, that office is performed by the water, which passes into the mouth of the fish, and from thence out at the gill-covers, on its way being strained through the singular structure called the "gills." These gills are able to extract from the water sufficient oxygen to purify the blood

of the fish. If the oxygen has already been extracted, the fish instantly dies. The same effect is produced if the fish be so held as to prevent the water from flowing in the proper direction, so that it is perfectly possible to drown a fish. Most anglers are perfectly aware of the power obtained by keeping the head of a hooked fish *down* the stream.

The elongated form of fishes, and their smooth covering, affording but little resistance to the water, beautifully show their perfect adaptation for the element in which they reside. Their rapid movements through the water are principally performed by means of a lateral vibration of the tail, just as a boat is sculled along by a single oar at the stern, or by a constant vibration of the rudder. The dead and mangled carcass of a flensed whale has been frequently known to swim for a considerable distance by the mere force of the muscular movements of the tail after death. The fins serve principally as balancers.

Most fish possess a singular organ called the "swimming-bladder." This is a membranous pouch, varying exceedingly in size and shape, situated close under the spine, and filled by some means with gas, mostly found to be nitrogen, but in deep-sea fishes, an oxygen is discovered to exist. The fish seems to be able to rise or sink by means of compressing or expanding this pouch, without being forced to make use of its tail or fins.

Fishes are vastly more numerous than all the other vertebrates put together. Some are fitted to live in salt water only, some in fresh water only, while others live in both. Some live in one place and some wander from place to place in great bodies called schools. Those which inhabit shallow waters are of the brightest colors, due mostly to the light, while those which live in deep water, where much light does not reach, are generally dull in color. Most of the common fishes are told about under their own names, but there are a great many very singular fishes in the sea which we have not room to describe. For instance, in Central America is a fish called the dora or hassar, which leaves its pond when the water dries up and marches overland in large droves in search of more water, moving along by little leaps; and in Malabar is a small fish called the sennal which climbs up the trunks of palm trees growing near the water's edge. The archer-fish of Japan lives on insects which it shoots with a drop of water blown from its long snout.

The smooth scaly covering with which most fish are furnished is admirably fitted both for defence against the water, and for enabling the fish to glide easily through places where a rough covering would have held it prisoner. Many valuable characteristics are derived from the shape of the scales in different fish. There are four principal varieties, called, 1, Placoid, or flat scales; 2, Ganoid, or polished scales; 3, Ctenoid, or toothed scales; and 4, Cycloid, or circular scales. These names are derived from 1. *πλακοῦς*, a flat cake; 2, *γανῶ*, I polish; 3, *κτεῖς*, *κτενός*, a comb; 4, *κυκλος*, a circle. The scales of the 1, Dogfish; 2, Sturgeon; 3, Perch; and 4, Carp, are excellent instances of the four kinds of scales. The Acanthop-

terygii are so called from their spinous fin rays. The perch is an excellent example of this order.

The RED GURNARD, or CUCKOO GURNARD, as it is sometimes called from the sound it utters when taken out of the water, is very common on the English coast. It is rather a small fish, rarely exceeding fourteen inches in length. The colors of its body when living are very beautiful, the upper part being bright red, and the under parts silvery white.

There are nine species of gurnard known to frequent the coasts of England, some, as the Sapphirine and the Mailed Gurnards, being most extraordinary in form. The Flying Gurnard is common in the Indian seas. Its pectoral fins are so much enlarged, that when it springs out of the water, when pursued by the dolphin or bonito, the wide quivering fins are able to sustain it in the air for a limited period. This fish has often been confounded by voyagers with the true flying-fish (*Exocoetus*), which belongs to an entirely different order.

The COMMON PERCH is well known to anglers both as a "bold biting fish," and as one that does not yield up its life without endangering the person of its captor; for the formidable row of spinous rays belonging to the first dorsal fin have wounded the hands of many an incautious angler.

It is extremely voracious, so much so that after all the legitimate bait has been exhausted, it is a common practice for the fisherman to place on his hook the eyes of the perch already taken, which are as eagerly bitten at as the worms were formerly. An anecdote is related of a gentleman who struck at a perch, but unfortunately missed it, the hook tearing out the eye of the poor creature. He adjusted the eye on the hook, and replaced the line in the water, where it had hardly been a few minutes before the float was violently jerked under the surface. The angler of course struck, and found he had captured a fine perch. This when landed was discovered to be the very fish which had just been mutilated, and which had actually lost its life by devouring its own eye. It is quaintly observed by Izaak Walton, that "if there be twenty or forty in a hole, they may be at one standing all caught one after another, they being like the wicked of the world, not afraid though their fellows and companions perish in their sight." The perch seldom exceeds two pounds and a half in weight, and a perch weighing a pound and a half is considered a very fine fish.

The MACKEREL.—The elegant shape and resplendent colors of the mackerel point it out as one of the most beautiful fishes known. Nor is it only valuable for its beauty, as it is highly prized as an article of food in most parts of the world.

Vast shoals of mackerel visit our coasts, and myriads are taken by fishermen both by nets and with lines. The line of nets frequently exceeds a mile in extent, and of course the number of fish contained in this enormous net must be beyond all calculation. On several occasions, the meshes of the net were completely choked up by fish hanging by their gills, and the net acted like a dredge, sweeping

up myriads more fish in a solid mass. In 1808, the whole net and its cargo sunk and were lost to the too successful fishermen.

The profits of the fishery vary exceedingly; sometimes the boats will hardly take a single mackerel, and at other times, or even in different spots, the draught of fish will nearly fill the boat. The fish require to be used soon after they are taken out of the water, as the flesh is very tender, and easily injured by exposure to the air, or by carriage to any great distance. When the fishermen employ the line for the capture of the mackerel, the hook is baited with a strip cut from a dead mackerel, and is suffered to trail overboard. The fish bite eagerly at this cannibal kind of bait, and are frequently taken by baiting the hook with a strip of scarlet leather or cloth.

The TUNNY is a rather large fish, averaging four feet in length, and is very common in the Mediterranean. Large fisheries are established during May and June, at which season immense shoals of these fish rove along the coast. The most approved method of fishing is by the "*madrague*" or "*tonnaro*." A large number of long and deep nets are placed along the shore, one edge being fixed to the bottom of the sea by anchors and weights, and the other edge kept at the surface of the water by corks. A wall is thus formed, stretching along the coast for nearly a mile in length. The tunnies swimming along the coast pass into this net, and continue their course until they are stopped by other nets placed across the principal net, and dividing it into chambers. From chamber to chamber the unfortunate fishes are driven through openings permitting their entrance, but preventing egress, until they arrive at the last chamber called significantly the "chamber of death." A strong net, placed horizontally, enables the fishermen to draw the tunnies to the surface, when a shower of blows from poles and similar weapons soon destroys the entire shoal.

The SWORD-FISH.—The well-known sword-fish inhabits every part of the Mediterranean Sea, and has several times been seen near other shores.

The "sword" for which this fish is so famous is an elongation of the upper jaw, of great strength, and capable of doing considerable injury to any object against which it directs its attacks. In the British Museum is a portion of the bottom of a ship, pierced completely through by the "sword" of one of these fish. Its unfortunate owner must have instantly perished by the shock, for the sword was imbedded almost to its base, and broken short off. In one instance, a sword-fish attacked a whaling-ship, and drove its weapon "through the copper sheathing, an inch-board sheathing, a three-inch plank of hard wood, the solid white oak timber of the ship twelve inches thick, through another two-and-a-half inch hard oak ceiling plank, and lastly perforated the head of an oil-cask, where it still remained immovably fixed, so that not a single drop of oil escaped.

In the Mediterranean, the fishermen eagerly chase the sword-fish. The harpoon and line are used, much in the same manner as in the whale fishery. The Si-

cilian fishermen have a strange superstition that if the sword-fish were to hear a word of Italian, it would instantly dive and escape them. They therefore restrict their vocal sounds to an unintelligible chant. It is said that the whale is an object



SWORD-FISH.—*Xiphias gladius*.

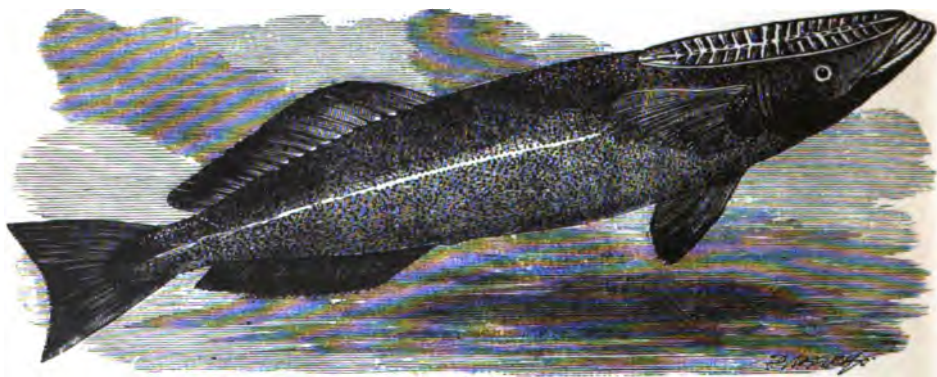
of particular enmity to the sword-fish, and that ships are struck by it, being mistaken for whales. The length of this fish is usually from twelve to fifteen feet. It is said to feed principally on tunnies, pursuing the shoals, and transfixing the fish with its sword.

The REMORA, or SUCKING-FISH, is remarkable for the peculiar apparatus situated on the upper part of its head. By this it can adhere to any object so firmly, that it is a difficult matter to make it loose its hold. It is often found adhering to large fish or to the bottoms of ships, probably in both instances for the sake of the fragments of food rejected by the one, or thrown overboard from the other.

The older writers on Natural History fully believed that one remora had the power of arresting the largest ship in its course, and fixing it firmly in the same spot, in spite of spread canvas and swift gale. As the remora is about the same size as a herring, our ancestors naturally considered this a very curious circumstance, and wrote no few poems on the subject. The following *true* account of this fish is extracted from Macgillivray's "Voyage of the Rattlesnake":

"Small fish appear to abound at this anchorage (the Calvados group of islands). I had never before seen the sucking-fish (*Echeneis remora*) so plentiful as at

that place ; they caused much annoyance to our fishermen by carrying off baits and hooks, and appeared always on the alert, darting out in a body of twenty or more from under the ship's bottom when any offal was thrown overboard. Being quite a nuisance, and useless as food, Jack often treated them as he would a shark, by spritsail yarding, or some less refined mode of torture. One day, some of us, while walking the poop, had our attention directed to a sucking-fish about two and a half feet in length, which had been made fast by the tail to a billet of wood by a fathom or so of spun yarn, and so turned adrift. An immense striped shark, apparently about fourteen feet in length, which had been cruising about the ship all the morning, sailed slowly up, and turning slightly on one side, attempted to seize

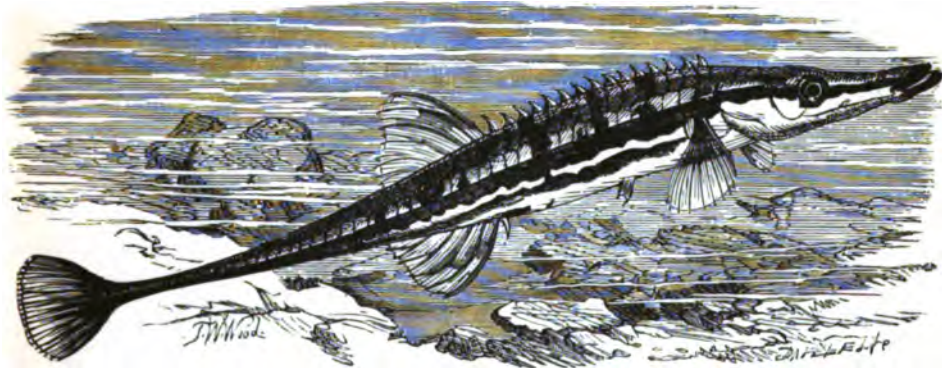


SUCKING-FISH.—*Echeneis remora*.

the apparently helpless fish, but the sucker with great dexterity made himself fast in a moment to the shark's back. Off darted the monster at full speed, the sucker holding fast as a limpet to a rock, and the billet towing astern. He then rolled over and over, tumbling about ; when, wearied with his efforts, he lay quiet for a little. Seeing the float, the shark got it into his mouth, and disengaging the sucker by a tug on the line, made a bolt at the fish ; but his puny antagonist was again too quick, and fixing himself close behind the dorsal fin, defied the efforts of the shark to disengage him, although he rolled over and over, lashing the water with his tail until it foamed all around. What the final result was we could not clearly make out."

The STICKLEBACK.—There are six species of sticklebacks known, the habits of all being very similar. They are most pugnacious little creatures, and will fight on the smallest provocation, dashing at each other and endeavoring to tear open their adversary's side with the sharp spikes that adorn their sides. The brilliant colors with which they are decorated only belong to the males, and not to them if

they have been vanquished. In such a case, the conqueror looks more brilliant than before, and sails about with as much dignity as can be assumed by an animal an inch and a half in length. The unfortunate individual who has been defeated



FIFTEEN-SPINED STICKLEBACK.—*Gasterosteus spinachia*.

sneaks off into some corner, and soon loses his beautiful coloring, his crimson, green, and gold panoply changing into a very dull matter-of-fact gray.

The courage of the sticklebacks is not only exerted against their own species. These little fish are quite aquatic lemmings, and will boldly attack a stick if it is placed near their haunts. I have often known them dash with such violence at a stick which I have presented to them, that the blow of their head against the wood produced a sensible jar.

The ANGLER, or FISHING FROG, as it is more generally called, is not uncommon in all the European seas. The peculiar formation of its pectoral fins enables it to crawl for some distance on land.

On its head are two elongated appendages, curiously articulated to the skull by a joint formed something like the links of a chain, and capable of movement in any direction. The angler crouches close to the bottom of the sea, and by the movement of its pectoral fins stirs up the sand and mud, and agitates the bony appendages amid the turbid cloud produced. The small fishes, observing the muddy water and taking the filaments for worms, approach to seize them, and are instantly engulfed in the capacious jaws of the crafty angler. The voracity of the angler is so great that, when caught in a net together with other fish, it generally devours some of its fellow-prisoners—a useless act, for the fishermen mostly open its stomach, and recapture the flounders and other fish found in its interior.

The Malacopterygian fishes have their fin membranes supported by flexible rays. The abdominal malacopterygii have their ventral fins situated on the belly, without any connection with the bones of the shoulder.

FISHING FROG.—*Lophius piscatorius*.

The COMMON CARP is a well-known inhabitant of our ponds, lakes, and sluggish rivers. It is a very shy and wary fish, rejecting one day a bait which had been freely taken the day previous. While fishing in a small pond, I took in one hour six or seven carp, weighing from half a pound to nearly three pounds each. A few days afterward, although the weather was equally propitious, the carp were not, and the whole day was spent without even a bite. It lives to a great age, and when very old its scales turn gray, just as human hairs do. In several places in France numbers of carp were kept until they attained an enormous size. These great sluggish fish were accustomed to come to the water's edge in order to be fed at the call of their keeper. Feeding the carp was almost a hereditary amusement of the later kings of France.

Very few fish are so tenacious of life as the carp. It is the custom in Holland to keep these fish in nets filled with wet moss. They are fed with bread and milk,

and are preserved in health by frequent immersion in water, in order to keep the moss thoroughly wet. Two or three pounds is the average weight of a good carp, but individuals have been known weighing upward of eighteen pounds. It is enormously prolific, as the roe of one female weighing nine pounds was found to contain six hundred thousand eggs. Of course comparatively few of these eggs arrive at maturity, by far the greater number being eaten by other fish.

The singular fish called the SEA-HORSE is common in many European seas. The habits of this fish are very singular and interesting. A pair were kept alive for some time in a glass vessel and exhibited considerable activity and intelligence.



SEA HORSE.—*Hippocampus brevicestris*.

They swam about with an undulating kind of movement, and frequently twined their tails round the weeds placed in their prison. Their eyes moved independently of each other, like those of the chameleon, and the changeable tints of the head closely resemble that animal. More than once, these curious fish have been seen

curled up in oyster shells. The singular creatures called Pipe-fish also belong to the Syngnathidæ.

The GUDGEON.—The ease with which the gudgeon is taken has passed into a proverb. This pretty little fish is usually found in shallow parts of rivers, where the bottom is gravelly. If the gravel is stirred up, the gudgeons immediately flock to the place, and a worm suspended amid the turbid water is eagerly snapped at by them. The fishermen usually take them in nets, and keep them alive in well-boats. They are largely purchased as baits for trolling. The flesh of the gudgeon is particularly delicate, and although its length rarely exceeds seven inches, yet from the ease with which numbers can be obtained, it forms a dish by no means to be despised.

The TENCH.—The habits of the tench are not unlike those of the carp, excepting that it seems even more sluggish than that fish. It especially delights in muddy banks of ponds, where the weeds grow thickly. Roget gives an account of a tench that had been taken out of a pond almost filled up with stones and rubbish, and which had actually grown into the shape of the hole where it had been confined, evidently for many years. The weight of that fish was eleven pounds nine ounces. Four hundred tench and as many perch were also taken out of the same pond. This fish is even more tenacious of life than the carp.

The ROACH is very common in most rivers of this country, and is generally spread over the temperate parts of Europe. It is by no means a large fish, rarely exceeding two pounds in weight, and seldom attaining even that size. These fish usually live in small shoals, and pass from one part of the river to another.

The roach is not unlike the dace, but may be easily distinguished by its bright red ventral fins, those of the dace being silvery white. It is rather a favorite with anglers, as it bites or rather nibbles at the bait in such a dainty and delicate manner that the disappointed fisherman not unfrequently finds the bait gone without the movement of his float betraying the theft. A quick eye and a dexterous hand are required for this sport. The float is so balanced as barely to appear above the surface of the water, for, unlike the perch, that dashes at the bait and boldly jerks the float at once under water, the roach does little more than swim under the bait as far as it can, and then just gives a gentle nibble, repeating the process until the bait has entirely left the hook.

The BLEAK and the MINNOW both belong to the genus *Leuciscus*. The former fish is remarkable for the use made of its scales, which when washed in water, deposit a powder much used in the manufacture of artificial pearls.

In some countries the LOACH goes by the name of "Beardie," in allusion to the little fleshy particles that hang from its lips. It has also the name of groundling, on account of its habit of living close to the bottom of the water. It is a common fish, and may be taken in most streams, especially if the bait is drawn over the bed of the stream. The principal peculiarity about the fish is the comparatively great

breadth of the tail where it joins the spine. This formation, together with the generally pellucid appearance of its body, at once distinguish it from any other fish.

The PIKE.—This fierce and voracious fish is now common in most rivers and lakes, although it was formerly so rare as to be rated at ten times the value of turbot.

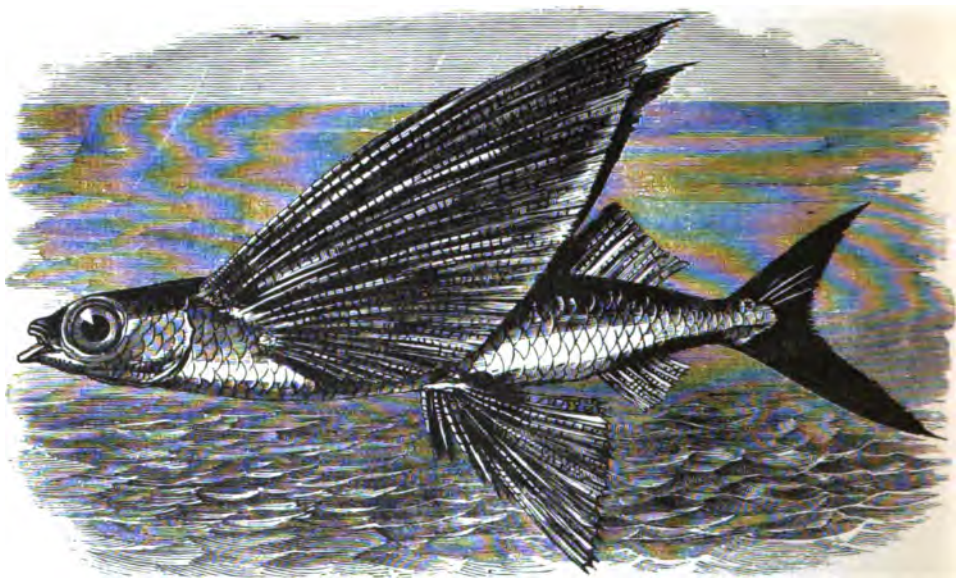
It affords much sport to anglers, who generally employ a method of fishing called "trolling." A gudgeon, roach, or large minnow, is so fixed to a number of formidable hooks, that when drawn through the water, it spins rapidly round, and attracts the notice of the watchful pike, who dashes at the glittering bait with a violence that jars the rod down to the very butt. Off swims the pike to his place of concealment, leisurely turns the head of the bait downward, and swallows it. Now, to swallow the fish is easy enough, but the array of barbed hooks proves an effectual obstacle to the endeavors of the pike to get rid of the unwelcome morsel as soon as the angler jerks the line, and gives the pike to understand that hooks have points. The deluded pike now endeavors to break the line, but a good fisherman foils all his efforts, and at last lands him, wearied and bleeding, but ferocious to the last.

The method of fishing for pike called "trimming" is hardly worth mention. A line baited with living fish is fastened to a float, and suffered to lie on the surface of the water. The pike, seeing the bait swimming about, dashes at it, and hooks itself in the effort. This fish varies in size from two or three pounds' weight to twenty or thirty; but a pike weighing fifteen pounds is considered a very fine fish. Above that weight they are almost useless for the table. A pike weighing less than two pounds is called a jack. In the Museum at Oxford is a pike weighing thirty pounds, that was taken in the lake at Blenheim Park. Another pike weighing twenty-five pounds, was caught a few months ago, and I have seen the skin of one that weighed thirty-five pounds when first caught.

The appetite of this fish is almost insatiable. Mr. Jesse threw to one pike of five pounds' weight four roach, each about four inches in length, which it devoured instantly, and swallowed a fifth within a quarter of an hour. Moor-hens, ducks, and even swans have been known to fall a prey to this voracious fish, its long teeth effectually keeping them prisoners under water until drowned.

The FLYING-FISH.—This fish, so celebrated in most books of voyages, is found in the warmer latitudes, but has several times been seen off our coasts. The so-called "flight" is very similar to that of the flying squirrels and dragons, the fish merely springing out of the water with a violent impetus, and sustaining itself in the air by means of its enormous pectoral fins. It is not able to alter its course while in the air, nor to rise a second time without repeating its course through the water. The reader will notice the remarkable fact that individuals of three wingless classes, the Mammalia, the Reptiles, and the Fishes, have each the power of sustaining themselves in the air.

The "flight" of this fish seldom exceeds two hundred yards. The unfortunate creatures are pursued in the water by "dorados," erroneously called dolphins, and other fishes of prey. To escape their finny tyrants, they spring into the air, and for a while escape. But the gulls and albatrosses are on the watch, and pounce on the



FLYING-FISH.—*Exocoetus volitans*.

flying-fish from above, so that the persecuted creatures are tolerably sure to fall a prey to one or the other of their foes.

The usual height of flight is about two or three feet above the surface of the water, but it has frequently been known to exceed fourteen feet, and in one instance a flying-fish came skimming into the ports of a large man-of-war, nearly twenty feet above the water. The size of the fish is about the same as that of a herring. Sailors are always glad to capture it, as its flesh proves an agreeable change from the eternal salt junk, by which the power of the sailor's teeth is woefully tried. The food of this fish is molluscs and small fishes.

The SALMON is a migratory fish, annually leaving the sea, its proper residence, and proceeding for many miles up rivers, for the purpose of depositing its spawn. This duty having been accomplished, it returns to the sea in the spring. The perseverance of this fish in working its way up the stream is perfectly wonderful. No stream is rapid enough to daunt it, nor is it even checked by falls. These it surmounts by springing out of the water, fairly passing over the fall. Heights of

fourteen or fifteen feet are constantly leaped by this powerful fish, and when it has arrived at the higher and shallower parts of the river, it scoops furrows in the gravelly bottom, and there deposits its spawn. The young, called "fry," are hatched about March, and immediately commence their retreat to the sea. By the end of May the young salmon, now called "smolts," have almost entirely deserted the rivers, and in June not one is to be found in fresh water. Small salmon weighing less than two pounds are termed "salmon peel;" all above that weight are called "grilse."

The havoc wrought among salmon by foes of every description is so enormous that, notwithstanding the great fecundity of the fish, it is a matter of surprise that so many escape destruction; for although the fish are preserved from their human foes by many stringent regulations, yet other foes, such as otters, who devour the large fish, and other fish who devour the spawn, have but little respect for laws and regulations.

While in the rivers, multitudes of salmon are annually caught, usually by stake-nets, which are capable of confining an immense number of fish at one time. Salmon-spearing is a favorite amusement. This animated and exciting sport is usually carried on by torch-light. The torches, when held close to the surface of the water, illumine the depths of the river, and render every fish within its influence perfectly visible. The watchful spearman, guided by slight indications bearing no meaning to an unpractised eye, darts his unerring spear, and brings up in triumph the glittering captive, writhing in vain among the barbed points. In the northern rivers this destructive pursuit is carried on to a great extent, more than a hundred salmon being frequently taken in an evening. Anglers also find considerable sport in using the fly for this beautiful and active fish, whose strength makes it no mean antagonist.

The COMMON TROUT is found in many rivers in this country, always preferring rapid, shallow, and sparkling streams, especially if there should be little falls at intervals. The Derwent and the Dove are particularly famous for their trout. The latter river is quite the *beau ideal* of a trout stream. It never seems to know its own mind for half a mile together. Sometimes it is rapid, frisking over stones, and round trees, and throwing up the sparkling foam in all directions. Presently it has changed into a silent, slow, melancholy river, with dark pools of unknown depth, shaded by over-hanging trees, and suggestive of murders successfully concealed. Everywhere are the trout. Lying quietly under the shelter of some large stone, while the water is leaping round them are the moderate-sized trout, darting off like meteors to snatch at a passing fly, and as quickly returning to their concealment. In the deeper pools are the larger fish, who are too sagacious to be deceived by the artfully made fly of the professional angler, yet often fall victims to the less scientific but more successful ploughboy.

Several of my schoolboy years were spent near the banks of the Dove, which

river, of course, formed one of our favorite haunts. We were accustomed to take the large trout by the rather unsportsmanlike, but very amusing method of "tickling." It was excessively amusing to watch the angry countenances of anglers, who came to the Dove bedizened with all the appurtenances of rods, lines, baskets, etc., and who, after whipping the water most perseveringly for the whole morning without a single bite, while resting their tired arms, saw the country boys seated on the bank, armed with a long stick, and a line barely two feet long, adding every minute to the heap of glittering fishes at their side.

The usual method of fishing for trout is with a fly, but trolling with a minnow is often successfully used, nor does the trout reject a well-selected and properly arranged worm. The brilliant speckled tints of this beautiful fish vary much according to the locality and the time of year. In May the fish assume their brightest colors and their most delicate flavor. The size of the fish also varies exceedingly, being from half a pound in weight and about eight inches in length, to ten or fifteen pounds' weight. The smelt belongs to this family, and in its progress to the sea is destroyed in great quantities in mill-ponds, etc.

The value of the HERRING family to man is almost incalculable. The PILCHARD and the herring are very similar in appearance, but may be easily known by the position of the dorsal fin, which in the pilchard is so exactly in the centre of the body, that if the fish is held by it, the body exactly balances; while in the herring, the dorsal fin is placed rather backward, so that when suspended the fish hangs with its head downward.

The herring makes its annual appearance on the coasts of America about June. This most valuable fish arrives in enormous shoals, five or six miles in length, and three or four in breadth. Their advent is heralded by various sea-birds, such as the gannets and gulls, which constantly hover over the shoals and commit unceasing devastation among them. Yet in spite of the myriads destroyed by birds and fishes, in spite of the shoals captured by man, in spite of the vast quantity of spawn devoured by other fishes, their numbers seem quite undiminished, and each year they are led by the instinct inculcated in them by Providence, to visit the shore in incalculable numbers, not only to yield to man an unfailing supply, but to make the necessary provision for the increase of their number.

The fishery is conducted by boats and nets, the whole fitting up of each boat costing little less than \$5000. To add to the expense, the whole apparatus must be renewed every four or five years, as, independently of the injuries inflicted by the sea and the weight of fish, the dog-fish, which unremittingly follows the shoals of herrings, is often entangled in the nets together with its intended victims, and by its sharp teeth and vigorous struggles makes sad ravages among the nets.

When taken out of the water, the herring dies almost immediately, as do all fish that live near the surface of the water. Those, on the contrary, as the carp, tench, eels, and the flat-fish, who reside at the bottom, are able to sustain life for a

much longer period when taken out of their native element. It is therefore necessary that the herrings should be cured as soon as possible. The "white herrings" are cured in the boats, but the "red herrings" are taken on shore, and suspended in the smoke of a wood fire for twenty four hours, in addition to the salting that both they and the white herring undergo.

The well-known SPRAT (*Clupea Sprattus*) also belongs to the genus *Clupea*, and, like the herring, visits our shores in large shoals. The sprat fishery commences in the beginning of November. Not only are enormous quantities of this small but useful fish used as food, and sent into all parts of this country, but they are very largely used as manure—fish, according to the researches of Sir H. Davy, being a most powerful manure, retaining its fertilizing influence for a long time. Many thousand tons' weight of sprats are annually used for this purpose. The white-bait belongs to the same family.

The little ANCHOVY is a fish of no small importance, being very largely used in various sauces, besides the numbers that are preserved in pickle. It is common in the Mediterranean, and is also found on our coasts. The upper jaw of this fish is longer than the lower one; the entire length of the fish is usually from four to five inches, but it has been seen measuring upward of seven inches.

In the FLAT-FISH we see a most extraordinary instance of adaptation of structure to peculiar circumstances. We have all seen flat-fish, and all know that the upper side is dark, and the under side nearly white. The word "side" is used advisedly, as these curious fish actually lie *on their sides* at the bottom of the water while undisturbed or merely feeding. When, however, they are alarmed, they rapidly assume the vertical position, and dart off with great speed. The dark upper surface serves to protect them from becoming too visible to enemies above. The two eyes are also placed on the upper side of the head for obvious reasons. In fact, the whole fish appears as if it had been laid on its side, and rolled flat, the head also being twisted round, and the lower eye removed to the upper surface.

The COMMON SOLE is too well known to need much description. This fish is the reverse of the turbot, having the eyes and color on the right side, although, as in the turbot, varieties are not rare. It is in season during most parts of the year, except a few weeks in March or April.

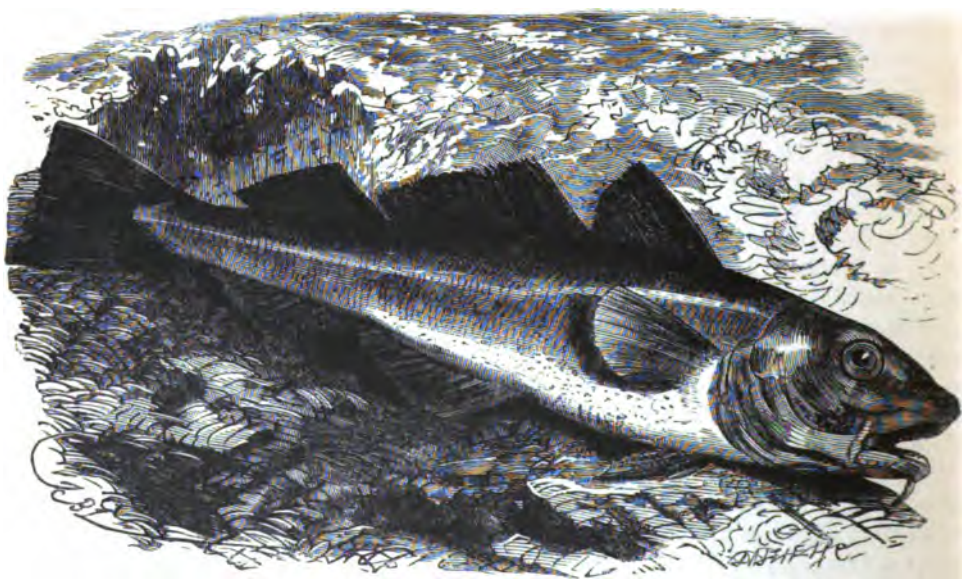
Although it is a marine fish, it seems to thrive well in river-water, or even in a pond. Mr. Arnold kept several in a pond, where the soles became twice as thick in proportion to their length as those living in the sea.

The TURBOT is found on the coasts of most parts of England, but the fisheries are nearly exclusively confined to the southern coasts of Ireland. The fishery is conducted both by nets and lines. The net, called the haul-net, drags from the bottom not only turbot but other flat-fish, such as soles and plaice. The line, used when the bottom of the sea is too deep or rocky for the net, is armed with many hooks, baited with smelts and other small fish. The lampern or river lam-

prey, was formerly in very great use as a bait, as its brilliant silvery appearance, and its great tenacity of life, rendered it peculiarly fit for the capture of the voracious but dainty turbot, who, rejecting all stale or discolored baits, eagerly devours them if bright colored and moving. The fishermen state that the turbot will not touch a bait that has been bitten by any other fish. On the coasts one turbot-line frequently extends for three miles in length, and is furnished with 2500 hooks, which are attached to the main line by small horse-hair lines, each twenty-seven inches in length. This enormous line is "shot" across the current at the turn of the tide.

The Cod.—In this sub-order the bones of the ventral fins are placed under, and support the bones of the shoulder.

The well-known codfish is principally found on the coasts of Newfoundland, but is taken in great numbers on our own shores. The hook is generally employed



COD.—*Gadus morhua*.

for the capture of this fine fish. An immense number of hooks, each baited with a whelk or limpet and attached to short lines, are fastened at intervals along a rope, which is stretched, or shot, as it is termed, across the tide, in order to prevent the hooks from getting entangled. Such is the voracity of the fish, that nearly five hundred have been taken by one man in the course of ten hours. The intense cold renders the cod fishery a service of great hardship. When taken, the fish are placed in a well-boat, through which the salt water has a free passage, so that the

codfish are brought to market still living. Several successful experiments have been made to preserve this fish in salt water ponds, in which it appears to thrive well. The fecundity of this fish is almost incredible, the roe of one fish having been ascertained to contain *nine million eggs*. The whiting belongs to this family.

The EELS form a sub-order of the Apoda, or footless fish, so called from the absence of ventral fins. These fish assume a form very similar to the serpents. Although on a hasty examination they seem to be devoid of scales, yet when the skin is dried, very minute scales may be seen through the semi-transparent outer skin, and may be easily detached by carefully separating the two skins.

Eels inhabit muddy ponds and rivers, and are common in many canals. They are susceptible of cold, and constantly descend the rivers to deposit their spawn in the sea, after which the young, when hatched, work their way up the rivers, thereby precisely reversing the habits of the salmon. They are capable of living out of water for a long time, and often make voluntary land excursions, either for the purpose of avoiding an insurmountable fall, or in search of frogs or worms, on which they feed. In the winter, while they are lying torpid in the mud, multitudes are taken by eel-spears—many-pronged instruments, whose prongs are feathered with recurved barbs, which, when pushed into the mud, entangle the eels, and effectually prevent their escape. There are supposed to be four species of English eel; namely, the Sharp-nosed, the Broad-nosed, the Snag, and the Grig.

The ELECTRIC EEL.—This curious fish, which exhibits the singular phenomenon



ELECTRIC EEL.—*Gymnotus electricus*.

of voluntary electric power residing in a living animal, is an inhabitant of the fresh-water rivers and ponds of Surinam, and other parts of South America, where it was first discovered in the year 1677.

This power of emitting an electric shock is apparently given it in order to enable the creature to kill its prey. Those who have seen the electric eel in the Polytechnic while being fed, will have little doubt of this. The fish given to it are, directly it becomes aware of their presence, instantly struck dead and then devoured. This specimen is unfortunately blind, but it has learned to turn in the direction of a paddling in the water, made by the individual who feeds it. The fish is scarcely in the water before the shock from the gymnotus kills it. The usual length of the gymnotus is about three feet.

Humboldt, in his "Views of Nature," gives a very animated description of the method employed by the Indians to take these formidable creatures—a method equally ingenious and cruel. Knowing from experience that the powers of the gymnotus are not adequate to a constant volley of shocks, they contrive that the shocks shall be expended on the horses instead of themselves. Having found a pool containing electric eels, they force a troop of wild horses to enter the pool. The disturbed eels immediately attack the intruders, and destroy many of them by repeated shocks; but by constantly forcing fresh supplies of horses to invade the pool, the powers of the gymnoti become exhausted, and they are then dragged out with impunity.

THE SHORT SUN-FISH.—This order derives its name from the curious structure of the jaws, which are fixed together in a very peculiar manner. The short sun-fish has been frequently taken on almost all parts of our coasts. It is of a most singular shape, looking as if three fourths of a very large fish had been cut off, leaving only the head and shoulders, something like a marine Baron Munchausen's horse. It attains to a very large size, and has been known to weigh three hundred pounds, its length being only four feet five inches. It lives mostly at the bottom of the sea, but frequently rises to the surface, and lies, perhaps sleeps, floating with the tide. Sailors in this case are fond of trying their skill with a harpoon. When struck, it uses very powerful but exceedingly awkward efforts to escape. The sailors of course eat it, as they do almost anything.

THE STURGEON.—The remaining fishes belong to the Cartilaginous sub-class; that is, their skeletons are composed of cartilage, and not of true bone. The first sub-order possess free gill-covers, like those of all the preceding fish; but the remainder breathe by means either of slits, as in the sharks, or holes, as in the lampreys. The sturgeon is remarkable for the rows of bony plates extending along the body. It is exceedingly common in the northern parts of Europe and in North America, where regular fisheries are organized for its capture. Almost every part of it is used. Isinglass is obtained by drying and shredding the air-bladder; caviare is made of the roe of the female, and the flesh is extensively pre-

served both by pickling and salting, besides the large quantities that are consumed fresh. The flavor of its flesh is said not to be unlike veal.

It has occasionally been taken on our coast, usually by entangling itself in the nets, and although it then does some injury to the nets by its violent struggles to release itself, it is otherwise perfectly harmless. Yarrell mentions that a sturgeon measuring eight feet six inches in length, and weighing two hundred and three pounds, was taken in a stake-net near Findhon. A specimen was once caught in the Esk, weighing four hundred and sixty pounds. The female always deposits her eggs in fresh water, and the young, when hatched, descend to the sea, and are supposed not to return again until, in their turn, they seek the fresh water in order to deposit their spawn.

The SHARKS and RAYS have no gill-covers, but the water passes through five elongated apertures on each side of the head. The sharks are proverbially ferocious and dangerous creatures, and are the pest of those seas which they infest. Their mouths are furnished with several rows of sharp, jagged teeth, which can be raised or depressed at pleasure, and which can cut through a limb or even the body of a man with the greatest ease. The mouth of these fishes is placed beneath the head, so that a shark cannot seize its prey at the surface of the water without turning on its side, which evolution often gives time for its expected prey to escape.

The Little Spotted Dogfish is the most common of the sharks that visit our shores. It is principally known on account of the havoc it makes among the fish during the seasons of the various fisheries, for which reason it is most especially detested by the unfortunate fishermen, who not unfrequently, together with their expected spoil, draw up a few dogfish in their nets. The dogfish, on finding themselves entangled, immediately commence tearing the nets to pieces with their sharp and powerful teeth.

The empty eggs of this fish are often found washed up on the sea-shore, and called by the name of "mermaids' purses." They are oblong, and furnished at each corner with a long, semi-transparent convoluted tendril, the use of which is apparently to entangle and fix the egg among the seaweed, and thus prevent it from being washed on shore until the young is hatched. A considerable quantity of oil can be obtained from the brain of the dogfish, and the skin, in common with that of other cartilaginous fishes, is made into shagreen.

The White Shark is a well-known scourge of the Mediterranean Sea and the Atlantic Ocean. This is the creature so detested by sailors, who, when they have caught a "shirk," subject it to every possible indignity. This voracious creature has been known to swallow an entire man, and as it is in the habit of lurking about ships for the sake of the scraps thrown overboard, and almost invariably swallows whatever is cast over the side, the contents of its stomach are often of a most heterogeneous description. The sailors always amuse themselves by seeing what the shark has "stowed away," and the substances thus brought to light have been most

curious. The entire contents of a lady's work-basket, down to the scissors, were found in the interior of one shark, and another had actually swallowed an entire bull's hide—a circumstance which led the operating sailor to remark that the shark had swallowed a bull, but could not "digest" the hide.

The amphibious South Sea Islanders stand in great dread of the shark, and with good reason, for not a year elapses without several victims being offered to the rapacity of this terrific animal. Nearly thirty of the natives of the Society Islands were destroyed at one time by the sharks. A storm had so injured the canoe in which they were passing from one island to another, that they were forced to take refuge on a raft hastily formed of the fragments of their canoe. Their weight sunk the raft a foot or two below the surface of the water, and, dreadful to say, the sharks surrounded them and dragged them off the raft one by one, until the lightened raft rose above the water and preserved the few survivors.

The SAWFISH is found in the greatest perfection in the tropical seas, although it also inhabits the Mediterranean. The weapon from which the fish derives its name is a flat, long prolongation of the head, on each edge of which are set hard tooth-like projections, curiously inserted into the bone. This fish has been known to employ its saw in the attack on the whale, burying the apparently inappropriate weapon to the very root in the body of the whale; nor are instances wanting where the saw has been found firmly imbedded in the hull of a ship.

The strength of the sawfish is very great. Captain Wilson gives an account of the capture of a sawfish measuring twenty-two feet in length, and weighing nearly five tons. After the fish had been entangled in a net for several hours, making violent efforts to escape, Captain Wilson got a rope firmly fixed round its saw, and set thirty men to haul at the rope. The whole thirty could not move it one inch, nor was it until one hundred men had been pulling at the rope for nearly the whole of the day, that they succeeded in dragging it on shore. Even then it made such violent strokes with its saw, that they were forced to fasten strong guy ropes to prevent it from cutting them to pieces. It was finally disabled by a Spaniard, who cut through the joint of the tail.

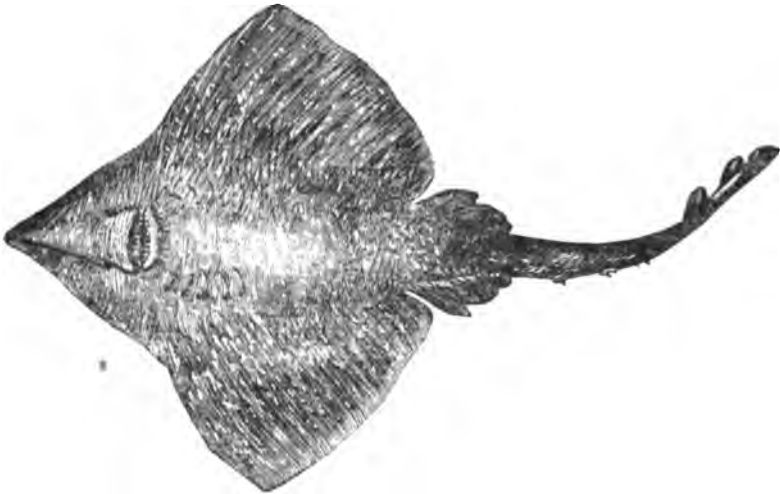
The TORPEDO may fairly be considered a British fish. It affords a second instance of the electric power residing in a fish. The organs that produce the electric shock are shown externally by two elevations extending from the eyes about half way down the body. Although it has once or twice been caught on our coasts, it is usually found in the Mediterranean, where its powers are well known, and held in some awe. The shock that the torpedo gives, of course, varies according to the size of the fish, and its state of health, but a tolerably large fish in good health can, for the time, disable a strong man. From the effects of its shock, it is in some parts called the cramp-fish.

Colonel Montagu notices a torpedo caught on a turbot line, at Tucky. It weighed about one hundred pounds, and completely puzzled the fisherman, who

found it hanging dead on the hooks, and had never seen such a creature before. Colonel Montagu quaintly remarks that, had it not been dead, the fisherman would certainly have had a shock that would have made him remember the species again.

The RAYS are at first sight not unlike the turbot and sole, but a closer examination will show that the rays really swim with their backs upward, whereas the turbot swims on its side. The movement of the ray is very curious, and is admirably expressed by the word "sluddering"—used by an old fisherman.

The Skate is caught in abundance on our shores, and in England is in much request as an article of food, although by many it is used principally for bait. The



THORNBACK SKATE.—*Raia clavata*.

Thornback Skate derives its name from the spiny armature of the tail, with which the fish defends itself most vigorously by bending itself almost into a semicircle and lashing about with its tail. The female of the thornback skate is termed a maid. It often attains to a large size, the largest known being twelve feet in length, and nearly ten in width. The jaws of the rays are exceedingly powerful, and enable them to crush with perfect ease the various shell-fish on which they feed. The Sting Ray is another species, which is armed with a serrated bone in its tail, with which it can inflict painful and even dangerous wounds.

The LAMPREY.—These curious fishes, in many respects the lowest in organization of the vertebrated animals, are chiefly remarkable for the singular construction of the mouth, which, formed like that of the leech, enables the lampreys to hold firmly to any object by suction. The breathing apparatus appears externally to consist of

fourteen small apertures, seven on each side of the neck. Their progress through the water is accomplished by a rapid undulating movement.

The Marine Lamprey is found in the Mediterranean, and in most of the northern European rivers. It has also been discovered in America. Like many other fishes, it travels for many miles up rivers for the purpose of depositing its spawn, at which time it is considered to be in the highest perfection. The spawn is deposited in furrows, some excavated by the parent lampreys, who, by the help of their sucker-like mouths, rapidly remove even large stones.

The Lampern, or River Lamprey, is plentifully found in many rivers of America. Strange to say, the inhabitants of Ashbourne held it in some abhorrence, and there was only one individual possessing sufficient strength of mind to eat them. He found them a most agreeable addition to his ordinary diet. The lamperns, or lampreys as they were called, used to lie in masses of eighteen or twenty together in a hole, and if disturbed, set off down the stream with some speed. It was formerly held in great repute as bait for turbot, cod, and other fish, but in consequence of the diminished supply other substances have been employed. Its length is usually from twelve to fifteen inches. In some counties of England it is called seven-eyes, in allusion to the breathing apertures in the neck.

The MYXINE, which, although a decided fish, was classed by Linnæus among the worms, occurs frequently on the eastern coasts of this country. The fishermen find it within the bodies of fish attached to the lines. The Scarborough fishermen call such fish "robbed," as the myxine, in the course of a single tide, will devour the whole fish, except the skin and bones. It is usually found in the body of the cod. It is quite blind, but is supposed to derive considerable aid from the eight barbules ranged round its mouth. Six individuals have been found in the body of a single haddock. Along the under surface of the body are two rows of pores, from which the myxine is enabled to throw out a most copious gelatinous secretion, apparently for the purpose of escape from its enemies. The length of the myxine is from twelve to fifteen inches.

MOLLUSCS.

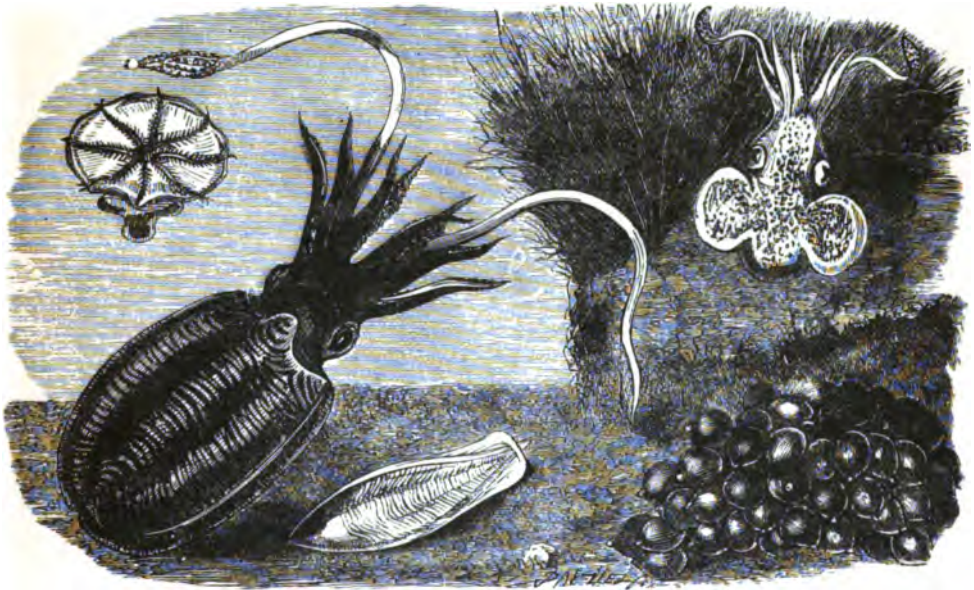
The MOLLUSCA have neither spine nor bones, the nervous system consisting of a number of nervous knobs called "ganglia," which give off filamentous nerves in different directions. Few molluscs possess eyes, but in one or two, as the snails and slugs, these organs are to be found, and in the higher molluscs, such as the cuttlefish, we see not only large and brilliant eyes, but also organs of hearing.

The CEPHALOPODA, so called from the organs of movement surrounding the head, are divided into *naked* and *testaceous*,* or covered with a shell.

The COMMON CUTTLEFISH is an example of a naked cephalopodous mollusc.

* Derived from Latin *testa*, a shell.

This repulsive-looking creature is common on our shores, and is, in spite of its unpleasant appearance, often used for food. Its eight long and flexible arms are covered with suckers of various sizes, enabling their owner not only to fix itself firmly to the rocks on which it dwells, but to seize and retain with the greatest tenacity any unfortunate fish or shell that may happen to come within its reach. Its powerful parrot-like beak enables it not only to devour fishes, but even to crush the shells and crustacea that are entangled in its deadly embrace. In this country, the cuttle does not grow to any great size, but in the Indian Seas it is absolutely



OCTOPODS.—EIGHT-ARMED CUTTLES.

dangerous, and the crews of boats are forced to be armed with a hatchet, to cut off the arms of the cuttlefish.

There are few who have not heard of the color "sepia." This is, or ought to be, prepared from a black pigment, secreted by the cuttlefish, and used in order to escape its foes, by blackening the water with the ink, and hurrying off under shelter of the dense cloud of its own creating. Dr. Buckland actually drew a portrait of a fossil cuttlefish with some of its own ink that still remained in its body. The substance sold in the shops as cuttlefish bone is a chalky substance secreted from the mouth of the fish, and composed of an infinite number of plates, joined by myriads of little pillars. The entire body is soft, and encased in a coarse, leather-like skin, unprotected by any shell.

The SQUID is much like the cuttlefish in looks. The common squid, found on the coast of New England, is six to twelve inches long, but very large ones have been found off the coast of Newfoundland. In 1872 one was seen whose body was nearly twice as long as a man, while its arms were five times as long as a man. It is thought that some of them grow to be at least fifty feet long. Such ones are very strong and dangerous. The "devil-fish" told about by Victor Hugo in his book called "*The Toilers of the Sea*," which catches a man and draws him down into his cave, is something like an octopus, but there is really no such animal in the world as the one he describes.

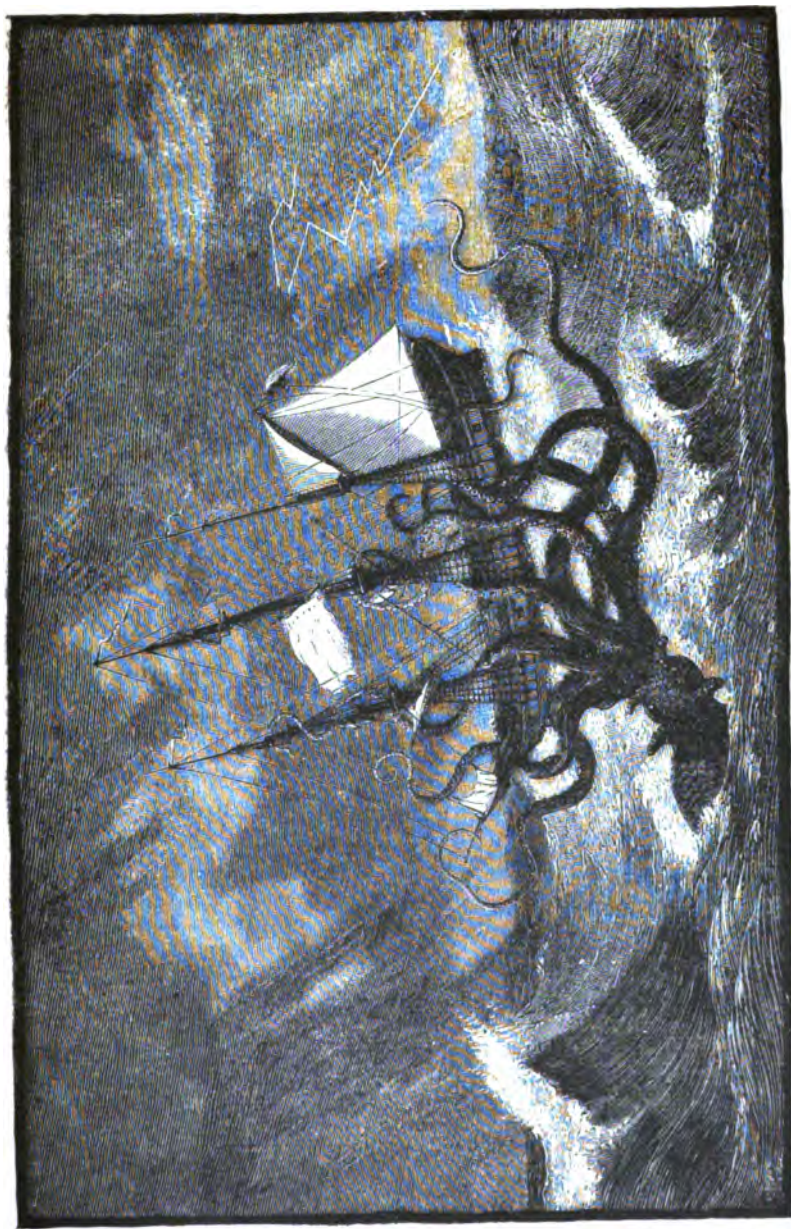
Squids make a large part of the food of whales, dolphins, and porpoises, and small ones are cut up for bait for codfish. In ancient times they were eaten by the Greeks and Romans, and they are now eaten by the modern Greeks during the long fasts of their church, when they are forbidden to eat either flesh or fish. The Chinese and the Indians of the Pacific coast also eat them.

Squids, or calmars, as they are sometimes called, are found on the coast of Norway, and they probably gave rise to the stories of the great sea animal called by the old writers the kraken, which was said to be a mile long and to look like an island when it was on the surface of the water. An old book gives a picture of a kraken drawing down into the sea a three-masted ship, around which it has wrapped its long arms; and a story is told of a bishop who set up an altar and said mass on the back of a kraken lying on the shore, which he mistook for a rock. The great monster lay still until the service was done, and then ran into the sea, to the terror of all present.

The principal eight-arm cephalopods are the OCTOPUS, or POULPE and the ARGONAUT. The common octopus, found in the European seas, has a round body about as large as a man's fist, with eight arms around it, each three or four feet long. Near the body these arms are joined by a tough skin, by opening and shutting which it can swim backward. It has also a tube which opens near its mouth, through which it blows out water, which helps it to swim in other ways. It can walk on its eight arms in the same way with the cuttlefish. In the seas of hot countries the octopus grows very large.

The ARGONAUT, or NAUTILUS, is an example of the testaceous molluscs. This curious creature, about which so many marvellous and poetical tales have been told, is very abundant in the Mediterranean. It has been clearly proved that the nautilus does *not* urge itself along the surface of the water by the expanded arms used as sails. These arms are in fact used to cover the shell, and it is from these that the beautiful shell is secreted. The argonaut propels itself through the sea by violently ejecting water from the tube with which it, as well as the cuttlefish, is furnished for that purpose. The colors of the living animal of the nautilus are exceedingly beautiful.

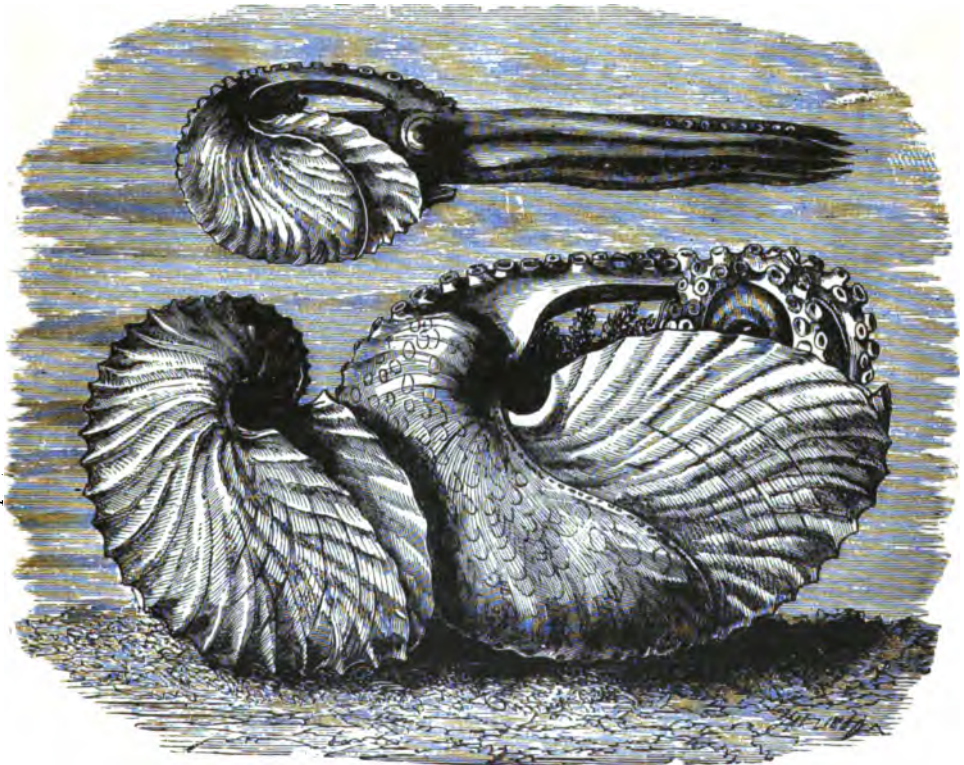
The arms of this creature are furnished with suckers. Its shell, when the poulpe



IMAGINARY SQUID.

(as the living argonaut is called) is still existing, is flexible and semi-transparent; but when the animal is taken away, the shell soon becomes rather opaque, and is very fragile. The fossil Ammonites belong to the testaceous cephalopoda.

Shells are secreted from a part of the inhabitant called the "mantle," and of course, as the shell is always added round the rim, as may be seen by taking a small snail in the spring, it naturally follows that, as the animal becomes larger, so the



ARGONAUT, OR PAPER NAUTILUS.—*Argonauta Argo*.

mantle becomes larger, and secretes a larger ring of shell. Many shells, as that of the oyster, are deposited in layers, a fine membrane interposing between each layer; they are therefore called membranous shells. Most membranous shells are lined with a brilliant enamelled substance, called "nacre;" "mother of pearl" is the nacre of the pearl oyster. That of the fresh-water mussel is a beautiful azure.

The other structure of shells is called "porcelaneous," because they look like porcelain or china. The common cowrie is a well-known instance of a porcela-

neous shell. Some shells are so transparent as to resemble glass, and are therefore called "vitreous." Shells are divided into univalve, or one-valved shells, such as the snail; and bivalve, or two-valved shells, such as the oyster. Those of the univalve molluscs are capable of protecting themselves when withdrawn inside the shell by a horny plate called the "operculum," which completely closes up the aperture, and which may be seen in the periwinkle. The closing membrane found in the common snail, if taken in the winter, is called the epiphragma, and is supposed to be hardened mucus.

The GASTEROPODA move by means of a fleshy disc or foot on the under surface of the body, and by the alternate expansive and contractive movements of this foot the creature is enabled to crawl. The gasteropoda inhabit both land and water, unlike the bivalves, which are exclusively inhabitants of the latter element. If the shell of a gasteropodous mollusc be broken, it has the power of repairing the injury by secreting fresh layers of shell from the mantle within.

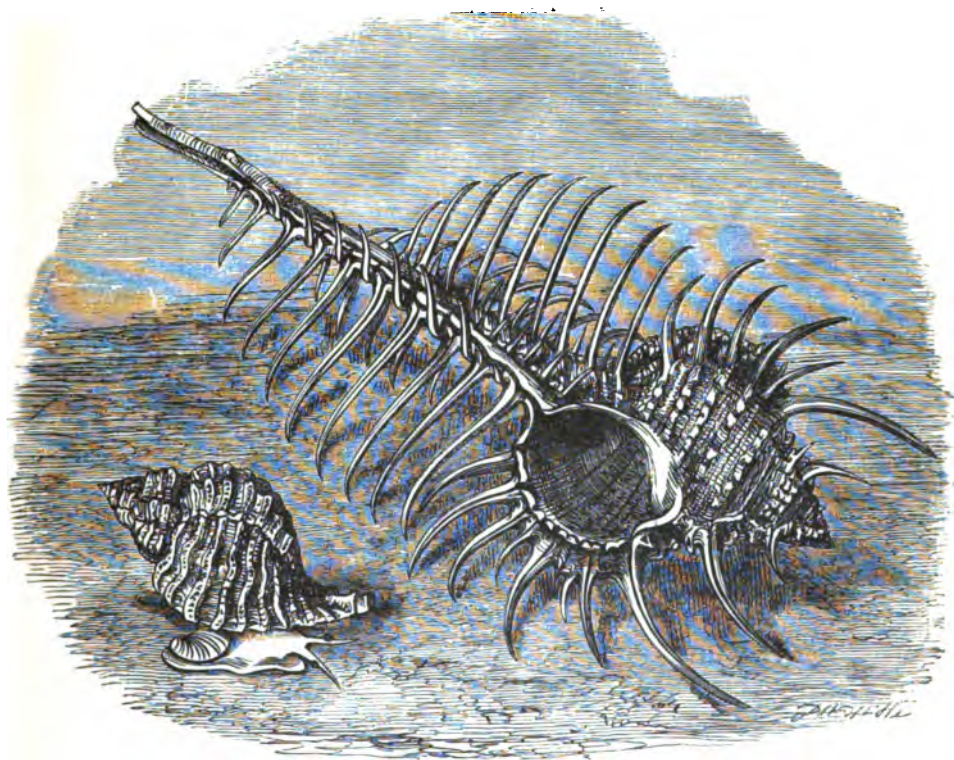
The SLUGS are well-known invaders of our gardens, and, together with the snail, the caterpillar, and the mysterious "blight," are objects of the gardener's most intense hatred. The black slug is usually found by hedge-banks and in grassy meadows. It seldom ventures out by day, especially if the day be bright; but at night, when the dew is on the ground, it may be seen trailing its dark length through the herbage, or eagerly devouring the leaves. While employed at night in decoying moths, by means of a fragrant compound of sugar, beer, and rum, spread on the trunks of trees, I used constantly to find my bait attacked by huge slugs of all kinds, descending and ascending toward the sweet but dangerous banquet. The small gray slug (*Limax cinerea*) is more common in gardens than the black slug.

The COMMON SNAIL.—Several species of snails inhabit this country, among which the edible snail (*Helix pomatia*), the belted snail (*Helix nemoralis*), and the common garden snail (*Helix aspersa*), are the most conspicuous. The edible snail was imported into England by the Romans, who prized them highly, and fattened them in a building erected for that express purpose, as indeed is now done in some parts of Europe. This snail grows to a large size, nearly attaining the magnitude of an ordinary closed fist.

The eyes of the snail are placed at the extremity of the tentacula, or "horns," as they are usually called. The common garden snail is so well known that no description of it is needed. It lays eggs very large in comparison with the size of the parent; they are about the size of small peas, round, soft, and semi-transparent. They are deposited about two inches below the surface of the earth. This creature is very tenacious of life. A living snail was exhibited, which had made a long sea voyage, packed up in cotton-wool. An immersion in water soon brought the inhabitant to view, and when it was exhibited it was crawling about a box in perfect health.

The beautiful THORNY WOODCOCK, sometimes called by the name of Venus's comb, is an excellent example of the Muricidæ. This elegant shell is an inhabitant of the Indian Ocean.

The ROYAL STAIRCASE WENTLETRAP affords us an excellent and most beautiful example of the Turbinidæ. It is a native of the Chinese and Indian seas, and was

WOODCOCK SHELL.—*Murex erinaceus*.THORNY WOODCOCK.—*Murex tenuispinis*.

formerly so scarce that a specimen two inches in length would sell for five hundred dollars. Even now, a very fine specimen cannot be obtained under thirty or thirty-five dollars. For this reason, the specific name "pretiosa" was affixed to it by Lamarck.

As an example of the large family of CONES, we will take the common cone, whose beautiful marbled color and elegant shape render it a most attractive shell.

The MONEY COWRIE and the WHELK.—The cowries are not less celebrated for the elegance of their form, and the beauty of their markings, than for the curious

circumstance that one species is used as current coin in Guinea and Bengal, thus being employed for the same purpose by two entirely distinct races of men, situated in different quarters of the globe. Their value is of course small in proportion to gold or silver. At the present time a rupee in Bengal is worth 3200 cowries, the value of the rupee being about thirty cents of our money.

The BUCCINIDÆ are so named from their fancied resemblance to a trumpet. The common whelk is everywhere abundant on our coasts, and is taken in such profusion that it is largely exported for food, and may be seen on the street stalls of the metropolis exposed for sale, like the oyster and periwinkle. The proboscis of this creature is of a most singular structure, and by means of the numerous teeth with which it is armed it is able to rapidly bore its way through shells, and then to feed upon the unfortunate inmate. The hermit crab often takes possession of the empty shell of the whelk. The famous Tyrian purple was obtained from one of the Buccinidæ, *Purpura imbricata*.

The LIMPETS are spread over every latitude, except the Arctic regions. The common limpet is to be found on every rock and large stone at the sea-side. The mode of its attachment to the rocks is very curious, and well repays a careful examination. Every one who has seen a living limpet knows how firmly it fixes itself to the rock. This is done by the inhabitant creating a vacuum on the under surface of its body, which causes the pressure of the atmosphere to keep it so tightly fixed to the rocks, that a blade of a strong knife is required to detach it. Frequently the margin or the shell adapts itself to the shape of the substance to which it adheres, proving that it must remain fixed in the same spot for a long time, and rendering it difficult to imagine from whence it can obtain sufficient nourishment to support life. Sometimes a large shell may be picked up covered with limpets, that adhere firmly to it in spite of the rolling of the waves, and the tossings about to which it must necessarily be subjected.

We now arrive at the BIVALVE MOLLUSCS. It has been already stated that the bivalves are all aquatic. These creatures are enabled to keep their shell firmly closed by means of a powerful muscle. Those who have attempted for the first time to open an oyster, must be convinced of the strength of this muscle. The two shells are united by a powerful elastic hinge, which after the death of the animal opens the shells widely.

The bilvalves do not enjoy such powers of locomotion as the univalves, yet some, as the fresh-water mussel, can urge themselves along by means of a fleshy organ called the foot; and so powerful in some is this organ, that by means of it the animal can not only burrow in the sand, but actually leap out of a boat. The rapid opening and shutting of the valves is used by some, as the scallop, as a means of progression. It is believed that the bivalves have no visual organs.

The common SCALLOP is found along our southern coasts, and in the seas

of Europe. This shell was formerly used as the badge of a Pilgrim to the Holy Land.

“ His pilgrim’s staff he bore,
And fixed the scallop in his hat before.”

It is a singular fact that in the stomach of the common scallop is found an earthy deposit, which when boiled in nitric acid in order to dissolve the animal and other portions, exhibits under a powerful microscope animalcules precisely similar to those which, in a fossil state, form the earth on which the city of Richmond is built.

The COMMON OYSTER has been for many ages considered as a delicacy for the table. In the times of the ancient Romans, we find that English “ native oysters ”



PEARL OYSTER.—*Meleagrina margaritifera*.

were exported to Rome, and then placed in the Lucrine Lake, where they were fattened.

On our coasts the oysters breed in large beds, to which vast quantities of young oysters are conveyed by the fishermen, and suffered to increase without molestation. During the months of May, June, and July,* the oysters breed, and are considered unfit for food. At this time the young, called “ spat,” are deposited in

* Most people are acquainted with the proverb that oysters are in season during the months in which is the letter *r*.

enormous numbers. They instantly adhere to the substance among which they fall; and this, whatever it be, is called "cultch," and is protected by severe penalties. About May the fishermen separate the spawn from the cultch, which is then thrown back into its former place. After May it is felony to disturb the cultch, as were it removed, mussels and cockles would rapidly take the place of the oysters.

The oysters are taken in the proper season by the "dredge," a kind of small net fastened round an iron framework, which scoops up the oysters and many other marine animals. The part of the oysters called the "beard" is in reality the respiratory apparatus.

The SEA MUSSELS are usually fixed where the tide leaves them alternately wet and dry, and it is worthy of notice that those "shell-fish" which are exposed to variations of this kind are enabled to close their shells so firmly as to prevent any evaporation. One species is extensively used as an article of food. The river mussels occasionally produce pearls of some value. The nacre of these mussels is of a beautiful azure blue.

The BARNACLE.—At first sight, the barnacle bears a close resemblance to a mussel-shell fixed to a long stem. On a closer examination, however, the difference is at once apparent. The shell is in fact composed of *five* pieces, and through the aperture of the shell are thrust two rows of arms, or "cirrhi," as they are more properly called. These cirrhi serve to entangle the small crustacea or molluscs which pass near their sphere of action, and which are then carried to the mouth and speedily devoured. The barnacle is always found adhering to some larger object, usually floating wood, and is very common on the hulls of ships. Although the perfect animal is permanently fixed, it has been discovered that the young are free and capable of locomotion; nor is it until a week or two has passed that they finally settle themselves. The name *Anatifera*, or Goose-bearing, has been given to this animal on account of the ancient story of the production of the barnacle-geese.

The CRUSTACEA are almost all aquatic animals. They have no internal skeleton, but their body is covered with a strong crust, which serves for protection as well as for strength. Their whole framework consists of a series of rings fitted to and working in each other; some forming limbs, and others developing into the framework supporting the different organs. From this reason they and the remaining animals, as far as the star-fishes, who have no limbs at all, are called "articulated" animals.

Their method of growth is very curious. Other animals, as they increase in size, experience no particular inconvenience. Not so the crustacea. Their bodies are closely enveloped in a strong, unyielding mail, which cannot grow with them. Their armor is therefore cast off every year, and a fresh coat formed to suit their increased dimensions. Not only is the armor cast off, but even the covering of the eyes, the tendons of the claws, and *lining membrane of the stomach, with its teeth*. They all possess the curious power of reproducing a lost or injured limb. In

the former case, a fresh limb supplies the place of that lost ; and in the latter case, the animal itself shakes off the injured joint, and a new one soon takes its place. Lobsters, when alarmed, frequently throw off their claws.

The Decapods, as their name imports, are the fortunate possessors of ten legs, five at each side. They also possess three pairs of jaws, besides the teeth in the stomach. They breathe by means of branchiæ or gills, fixed at each side of the throat or chest, often erroneously called the head.*

The COMMON CRAB belongs to the short-tailed Decapods. It is abundantly taken on our coasts by fishermen, who employ for its capture a wicker basket called a "creel" or crab-pot. The crab-pots are made each with an aperture which permits the animal to enter, but forbids its egress—just like a common wire mouse-trap. A piece of a fish is fastened at the bottom of the creel, and the whole apparatus let down to the bottom of the sea, guarded by a line connected with a float, by means of which the fishermen draw it up and then remove its contents. Each float has a peculiar mark, by which the fisherman knows his own. When taken, the crabs are kept alive in well-boats, until wanted.

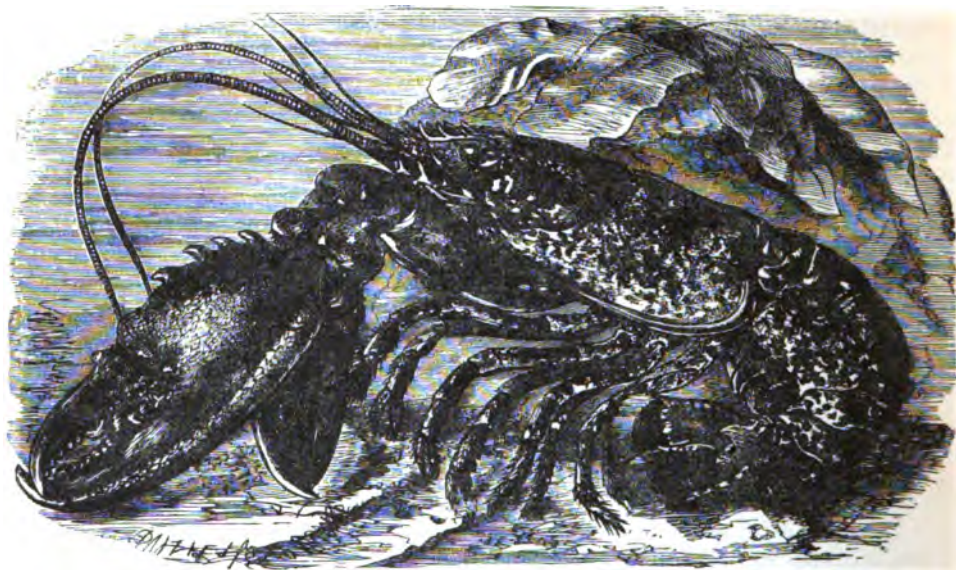
The HERMIT CRAB is not so well protected as most of his relations, for his tail has no shelly armor. He is therefore forced to protect his undefended tail by putting it into an empty shell, usually that of a whelk, and then walks about, dragging his curious house after him. Sometimes, two hermit crabs wish to obtain possession of the same shell, and then there is a battle royal. When the crab grows larger, he only has to change his old shell for a new one, and it is very amusing to see these creatures slipping their tails first into one shell, and then into another, until they have pleased themselves with a good fit.

They are very common on our coast, and may be found of all sizes, from the crab that fills a tolerably large whelk shell, to the little one whose habitation hardly exceeds the size of a pea. The Land Crabs make annual excursions to the sea in large armies. They go straight forward, and nothing except a house or such insurmountable barrier can stop them. Those of Jamaica are particularly celebrated.

The COMMON LOBSTER is found in great abundance on our coast, usually in the clear, rocky waters. The fishermen take great numbers of lobsters in baskets made on the same principle as those used for the capture of the crab. The powerful tail of the lobsters enables them to spring through a great distance if alarmed, and they have been seen to pass nearly thirty feet. They direct their course with wonderful accuracy, and can throw themselves through apertures hardly larger than the size of their bodies ; of course, they spring tail foremost.

The grasp of the lobster's claw is so tight, that to break off the claws is often the only method of disengaging its hold. Although enormous quantities are de-

*These animals have no distinct head, that and the thorax being merged into what naturalists call "cephalo-thorax," or head-thorax.

LOBSTER.—*Homarus vulgaris*.

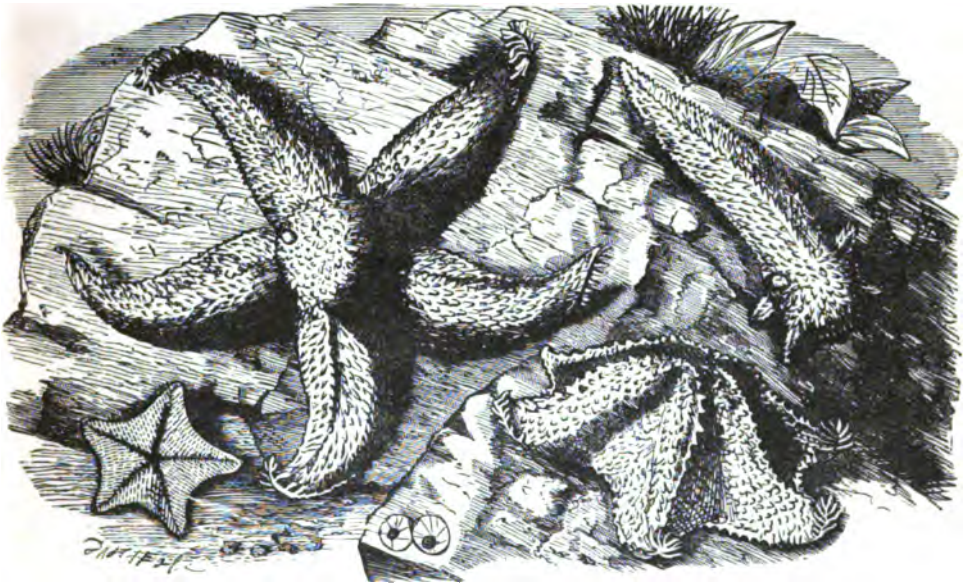
stroyed every year, they are so prolific that the supply never fails. The so-called lady's-fingers of the lobster are its breathing apparatus.

STAR-FISHES.—These creatures exhibit in the strongest manner the radiate form of body, the various organs boldly radiating from a common centre.

Many of these creatures are exceedingly common upon our own coasts, so plentiful, indeed, as to be intensely hated by the fishermen. Of these the common Five-fingered Jack, often seen on the New England coast, is perhaps found in the greatest number. All star-fishes are very wonderful beings, and well repay a close and lengthened examination of their habits, their development, and their anatomy. There are sufficient materials in a single star-fish to fill a whole book as large as the present volume, and it is therefore necessary that our descriptions shall be but brief and compressed. To begin with the ordinary habits of this creature. Every one who has wandered by the sea-side has seen specimens of the common five-fingers thrown on the beach, and perhaps may have passed it by as something too commonplace to deserve notice. If it be taken up, it dangles helplessly from the hand, and appears to be one of the most innocuous beings on the face of the earth. Yet, this very creature has in all probability killed and devoured great numbers of the edible molluscs, and has either entirely or partially excited the anger of many an industrious fisherman.

To begin with the former delinquency. It is found that the star-fish is a terrible foe to molluscs, and although its body is so soft, and it is destitute of any jaws or levers, such as are employed by other mollusc-eating inhabitants of the sea, it can devour even the tightly shut bivalves, however firmly they may close their valves. On looking at a star-fish, it will be seen that its mouth is in the very centre of the rays, and it is through that simple-looking mouth that the star-fish is able to draw its sustenance.

The second delinquency of the star-fish is achieved as follows. By some wonderful power the star-fish is enabled to detect prey at some distance, even though no



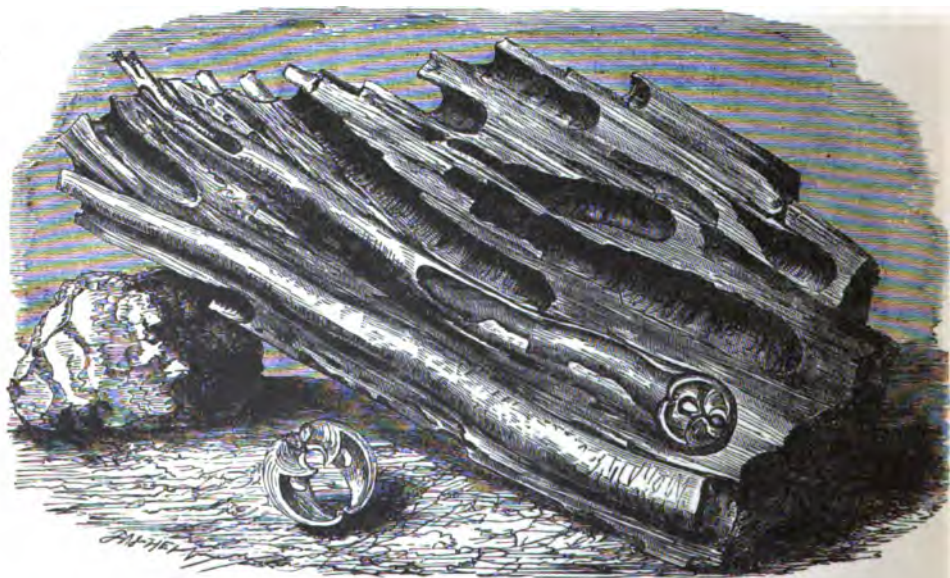
STAR-FISH.

organs of sight, hearing, or scent can be absolutely defined. When, therefore, the fishermen lower their baits into the sea, the star-fishes and crabs often seize the hook, and so give the fishermen all the trouble of pulling up his line for nothing, baiting the hook afresh, and losing his time. The fishermen always kill the star-fish in reprisal for its attack on their bait, and formerly were accustomed to tear it across and fling the pieces into the sea. This, however, is a very foolish plan of proceeding, for the star-fish is wonderfully tenacious of life, and can bear the loss of one or all of its rays without seeming much inconvenienced. The two halves of the *Asterias* would simply heal the wound, put forth fresh rays, and after a time, be transmuted into two perfect star-fishes.

The movements of the star-fish are extremely graceful, the creature gliding onward with a beautifully smooth and regular motion. It always manages to accommodate itself to the surface over which it is passing, never bridging over even a slight depression, but exactly following all the equalities of the ground. It can also pass through a very narrow opening, and does so by pushing one ray in front, and the folding the others back so that they may afford no obstacle to the passage. It also has an odd habit of pressing the points of its rays upon the bottom of the sea, and raising itself in the middle so as to resemble a five-legged stool. If the reader is desirous of keeping a few star-fishes in an aquarium, the object may be easily accomplished by keeping them in a very cool place, as they are extremely impatient of heat, and soon die if the water becomes too warm. They also require that a supply of air be frequently pumped through the water in which they reside.

In the illustration on this page we have an example of a creature which, though useful enough in many ways, and doing good service in transmuting dead and decaying substances into living forms, is yet the dread of mariners and the terror of pier-builders.

The SHIP-WORM, as this mollusc is appropriately called, from its depredations on the bottoms of ships and all submerged wooden structures, is found in most seas, and on our own coasts works fearful damage by eating into piles, planks, or even loose wood that lies tossing about in the ocean. I have now before me a



SHIP-WORM.—*Teredo navalis*.

portion of the pier at Yarmouth, which is so honeycombed by this terrible creature that it can be crushed between the hands as if it were paper, and in many places the wood is not thicker than ordinary foolscap. This piece was broken off by a steamer which accidentally ran against it; and so completely is it tunnelled, that although it measures seven inches in length and about eleven in circumference, its weight is under four ounces, a considerable portion of even the weight being due to the shelly tubes of the destroyers.

When removed from the tube, the ship-worm is seen to be a long grayish white animal, about one foot in length and half an inch in thickness. At one end there is a rounded head, and at the other a forked tail. The curious three-lobed valves are shown in the foreground as they appear when separated from the animal. The burrow which the creature forms is either wholly or partially lined with shell, and it is worthy of notice that the ship-worm and its mode of burrowing was the object that gave Sir I. Brunel the idea of the Thames Tunnel.

The PRAWN and the SHRIMP are so familiar to every one as to need but little description. Both are taken in nets swept along the sandy bottom of the sea. The



SAND-HOPPERS.—*Talitrus saltator*.

chief distinction in the appearance of these two creatures is the serrated or toothed ridge which runs along the back of the head, or rather carapace, of the prawn. When in their natural state, they are of a brown color, and only assume the pinkish

hue when boiled. Spirits of wine has the same effect. The Fresh-water Shrimp (*Gammarus Pulex*), and the Water-flea (*Daphnia Pulex*), both so common in our rivers and ponds, are placed among the Crustaceæ.

SPIDERS.

The Class ARACHNIDA, or the Spiders, are by many supposed to be insects. Such, however, is not the case. The Arachnida possess eight legs, while the true Insects only have six ; they undergo no transformations, they possess no wings or antennæ (the place of the latter organs being supplied either by two jointed claws, as in the Scorpions, or by two fangs, as in the Spiders); and their eyes are simple instead of compound.

Could people divest themselves of the horror felt at the sight of these creatures, especially of the larger sort, they would be well repaid by the interesting instinct displayed by all the spiders, who do not differ from each other more in form than in habits. Those of our own country afford an ample field, which has been as yet but imperfectly trodden. There are the Gossamer Spiders, who float high into the air, borne upon an almost invisible thread ; the Water Spiders, who form an airtight dwelling under the wave ; the Hunting Spiders, that creep stealthily upon their prey, and then spring on it like lightning ; the beautiful Garden Spiders, who wave from their self-afforded stores their geometrical nets ; the Pirate Spiders, who skim over the surface of the waters, and snatch up the drowning and helpless fly ; together with many others, whose form and habits must be familiar to any observer of nature. On account of the limited space that can be appropriated to each class, a short account of some of the principal species of this class is all that can be given.

The common Garden or Geometrical Spider, as it is called from the mathematical regularity of its net, is an excellent example of the spiders. The net is formed from a gummy substance secreted in an apparatus called the spinneret, through the holes of which the gummy secretion is drawn, and becomes hard when exposed to the air. Each thread is composed of many thousand lines. When the web is completed, the spider generally hides itself under a leaf or other convenient lurking-place, and from thence pounces upon any unwary fly that has entangled itself in the slender meshes. Should the fly be a large one, the spider rapidly encircles it with fresh threads until it has bound its wings and legs to the body, and then breaking off the few threads that held it to the net, bears it off triumphantly to its hiding-place. Frequently the geometrical spider sits in the centre of the web, apparently enjoying the air, and if disturbed shakes the net so violently that its shape is completely obscured by the rapidity of the vibrations.

The House Spider makes a thicker and irregular web, and hides itself at the



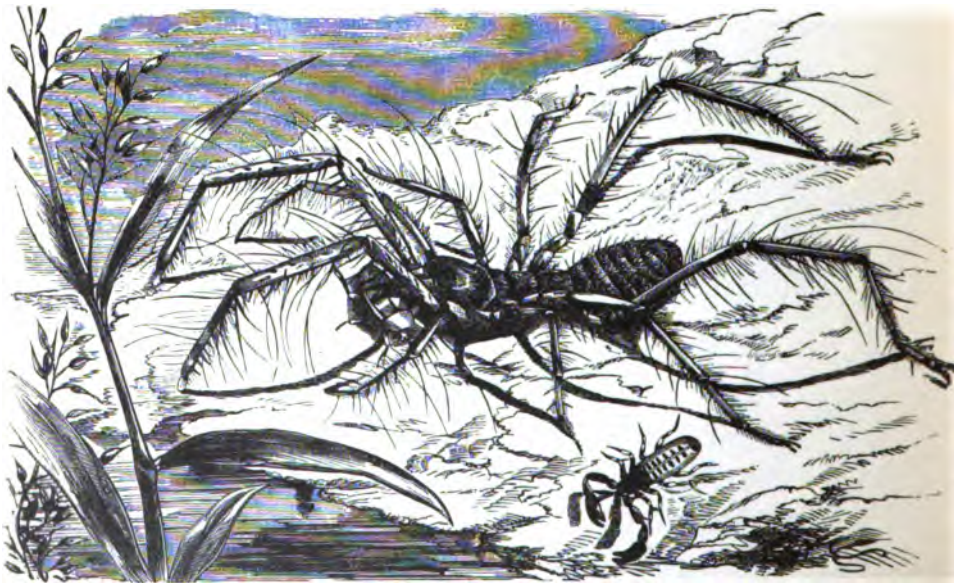
SPIDERS.

bottom of a silken tunnel communicating with the web. An acquaintance of mine had so far tamed a huge house spider, that it would come and take a fly out of his hand. He states that, as it sat at the bottom of its den, its eyes gleamed like diamonds.

Several endeavors have been made to procure silk from spiders, but although a sufficient quantity has been obtained to weave gloves from, yet spiders are so pugnacious that they cannot be kept together. The eggs of the spiders are enclosed in a silken bag, and when hatched, the young keep closely together, and when dispersed by an alarm, soon reassemble.

The TARANTULA, whose bite was fabled to produce convulsions which could only be appeased by music, is a spider of considerable size, inhabiting the south of Europe. It lives in holes about four inches deep in the ground.

THE SCORPION.—These formidable creatures inhabit most of the hotter parts of the globe. They are quite as pugnacious as the spiders, and if several are placed in



BOOK SCORPION.—*Chelifer Wideni*.

one box, they will fight until few survive, who immediately devour their fallen foes. The maxillæ of the scorpion are developed into large claws, like those of the lobster. With these the scorpion seizes its prey, and while holding it pierces it with its sting, which is situated at the extremity of its tail. The tail is composed of six joints, rendering it very flexible. The sting of this creature is exceed-

ingly painful, and with some persons dangerous; indeed, the sting of the large black scorpion of Ceylon is said to cause death.

The HARVEST-BUG.—These creatures are mostly minute, requiring the aid of a microscope fully to develop their form; but some are considerably larger, and their organs can be distinguished with the naked eye. In this order are included the common cheese-mite, the harvest-bug, the water mites, etc.

INSECTS.

The body of an insect is divided or *cut into* three parts, called the head, the thorax, and the abdomen. The body is defended by a horny integument, divided into rings, and connected by a softer membrane. The legs are in six in number. Many insects possess wings, and in all the rudiments of those organs are perceptible. The eyes are compound, that is, a number of eyes are massed together at each side of the head; and so numerous are they, that in the compound eyes of the ant are 50 lenses, in the house-fly, 8000, in the butterfly, 17,000, and in the hawk-moth, 20,000.

The insects pass through three transformations before they attain their perfect form. The first state is called the *larva** because the future insect is masked under that form; the second is called the *pupa*,† on account of the shape often assumed; and the third is called the *imago*,‡ as being the image of the perfect creature. Insects breathe by means of air-tubes, called tracheæ, which penetrate to every part of the body, even to the extremities of the limbs, antennæ and wings. The air gains access to the tubes by means of small apertures called spiracles. The tubes are prevented from collapsing by a delicate thread wound spirally between the two membranes of which the tubes are composed. This wonderful and beautiful arrangement not only prevents the tubes from collapsing, but keeps them flexible. There are, according to Stephens, whose arrangement is the one usually followed, fourteen orders of insects. Examples will be given of each, and their names explained. The most perfect insects are placed first.

There are two great divisions of insects, namely, those which bite and eat solid food with jaws, as the beetles, locusts, bees, etc., and those which suck liquid food through a proboscis, as the butterflies, flies, etc. The first order of insects derives its name from the sheath or covering with which the wings are defended. § This is a very extensive order, as, exclusive of exotic and other foreign beetles, it has been

* From Lat. *Larva*, a mask.

† From Lat. *Pupa*, a doll.

‡ From Lat. *Imago*, an image or effigy.

§ This, as well as the general covering of insects, is composed principally of a substance called by chemists, *chitine*.

discovered that no less than three thousand five hundred inhabit this country. The first in order of the British and American insects are the BEETLES.

Beetles may be known from other insects by the two horny sheaths or wing-covers called *elytra*, which cover their true wings so closely when they are not flying that they look as if they had no wings. The wing-covers are often very beautiful, being of various colors, blue, green, yellow, etc., and sometimes spotted with gold. The wings, which fold up under the covers very curiously when closed, are commonly twice as long and twice as wide as the covers. Most beetles' legs are long and fitted for running, and they have two strong horny mandibles or jaws, made for gnawing and chewing. They live on different kinds of food, some on other insects and worms, some on carrion, some on rotten wood and some on growing wood, some on grain, some on roots, and some on leaves and flowers.



SEXTON BEETLES.

Beetles pass through three full stages or changes in life. The larvæ or grubs have long, flat, worm-like bodies, with horny heads and three pairs of legs; but some, which are hatched inside of nuts and fruits, have no legs. Before going into the second or pupa state, the larva often makes a case or cocoon for itself out of earth or of little chips and dust fastened together by threads. Larvæ sometimes lie in these cases for years before turning into full beetles.

Beetles are found mostly in woods, under leaves, logs, and stones, under the bark of rotting trees, or in ditches and beside streams. Some live in the water, and may often be seen darting over the surface catching little insects. There are many thousand kinds of them, more than eight thousand of which live in the United States.

Tiger Beetles are so called from their stripes and because they are as fierce among insects as tigers are among quadrupeds. They prey on caterpillars, flies, and other beetles, and will even eat each other when shut up together. The Bombardier Beetle is so called from its habit of shooting a strong liquid from behind at its enemies—bombard being an old name for a cannon. Scavenger Beetles have feet fitted for digging, and make deep holes in the ground. They live on filth, of which they clear up a great deal. Some of them are called Carrion Beetles because

they eat up dead animals. Others, called Sexton Beetles, bury the bodies of animals. They have a very strong scent, and when they smell the dead body of a mouse, frog, or other small animal, they gather round it and examine the ground. If it is hard and stony, they look for a better place, and then a great many of them together carry the body there; but if the ground is soft they all set to work digging with their long legs under it till the animal sinks down into the hole. They then lay their eggs in it, cover it up, and when the larvæ are hatched they feed on it. If they left the body above ground, it would dry up and become unfit for their food, or some other animal might eat it. Among this class of beetles are also those commonly called "tumble-bugs," which make little balls out of manure and then roll them away with their hind legs. They lay their eggs in these balls, and roll them into deep holes which they dig. If the road is too rough they lift them up on their heads, which are broad and flat, and thus carry them. The ancient Egyptians thought these animals were so useful in manuring the ground with their balls that they called them sacred beetles, and worshipped them. They also carved figures of them in gold, precious stones, and other materials, and wore them as ornaments and charms. Many of these are still found in their tombs, and are called *scarabæi* (beetles, plural of Latin *scarabæus*, a beetle).

Other wonderful beetles are the Stag-horn Beetles, whose long jaws look like the horns of a stag. Our common Horn Bug belongs to this class. In some countries this kind of beetle is very useful in clearing up dead wood in forests. They lay their eggs in the bark of trees blown down by tempests, and their grubs eat up the whole tree, which is thus turned to dust and enriches the earth. The Spring Beetles or Snapping Bug is so called because when laid on its back it can spring up, turn over, and come down on its feet. Curculios or Weevils, are a kind of beetles that live on fruits and grains, and do great injury to crops. The worms found in plums, apples, chestnuts, and other fruit come from eggs laid in them by beetles. The Spanish Fly, which is ground to powder and made into blistering plasters, is a bright green beetle. *Fireflies* or Lightning Bugs, *Lady-birds*, Potato Bugs, Squash Bugs, June Bugs, and many other common insects are also beetles.

The beetle belongs to the order *Coleoptera*, or sheath-winged insects.

The Cockchaffer needs not much description. Its larva works great mischief during the spring, as it feeds on the roots of plants, and cuts them off with its sharp sickle-like jaws. Where many of these "grubs" have been, the grass curls up and dries like hay. One farmer actually collected eighty bushels of the grubs of the cockchaffer on his farm. Fortunately the thrushes, blackbirds, rooks, and many other birds, are inveterate destroyers of the grubs, and devour myriads of them. It is for this purpose that these birds pull up the grass, and not to spoil or devour the herbage, as is generally supposed.

The Huge Hercules and Atlas Beetles, and larger still, the Goliath Beetle, belong to the Lamellicorns.

The Glow-worm may be seen in the warm summer evenings, shedding its pale green light on grassy banks. The female insect gives out a much stronger light than the male, and there is some light visible even in the larva. The light of this insect proceeds from the abdomen. The light given out by the firefly, another kind of beetle inhabiting South America, proceeds from three yellow tubercles placed on the throat. The grub or larva of the glow-worm is of a singular form, and is furnished with a brush at the extremity of the tail, with which it cleanses its body from dust or the slime of the snails on which it frequently feeds.

The Musk-beetle.—The beautiful beetles, of which the common musk-beetle is an excellent example, vary considerably in size; some being several inches in length, while some are hardly one quarter of an inch long. The extreme length of their antennæ is the most conspicuous property, and from that peculiarity they are at once recognized.

The musk-beetle is a large insect. Its peculiar scent, something resembling that of roses, often betrays its presence, when its green color would have kept it concealed. When touched, it emits a curious sound, not unlike that of the bat, but more resembling the faint scratching of a perpendicularly-held slate-pencil. Its larva bores deep holes in the trees, which are often quite honeycombed by them.

The Rove-beetles form an exceedingly extensive section. Some are so small as to require the assistance of the microscope to discover their shape, and others are more than an inch in length. The small species are usually on the wing, and it is very amusing to see them alight, and with their flexible tails tuck their long and beautifully shaped wings under the elytra, run about for a moment, and then again take to flight. These are the creatures that cause so much annoyance by flying into one's mouth or eye in the warm months.

The Great Rove-beetle is commonly found upon decaying animal substances. It is most formidably armed with two large, curved, sharp mandibles, the bite of which is tolerably severe; and more than once, when the creature has been recently feeding upon putrid substances, dangerous results have followed.

I much regret that want of space has withheld me from giving accounts of many most interesting beetles, particularly some of the Carabidæ, the Silphidæ, Ptinidæ, and the Water-beetles. These last inhabit the water, and swim with remarkable activity. They occasionally come to the surface for a fresh supply of air, which they carry down between the elytra and the upper surface of the abdomen. They fly very well, but the construction of their limbs prevents them from walking. They cannot be kept in a limited space, as they are very fierce and voracious, and in one case, when a male and female were placed in a jar filled with water, only one day elapsed before the male was found dead and half devoured by his disconsolate widow.

The EARWIG is placed in an order by itself, called *Dermaptera*, from the soft

elytra. The wings are large and exceedingly beautiful, and the method of folding by which they are packed under the very small elytra is very curious. The use of the forceps seems principally for the purpose of folding the wings and placing them in their proper position under their cases. The eggs of the earwigs are hatched, and the young protected by the parent.

The LOCUST.—These pests of the warmer countries of the earth belong to the order called Orthoptera, because the wings are not folded transversely. They fly in countless myriads, and where they descend, they devour every particle of green herbage—the trees are stripped of their leaves, the grass and corn is eaten to the very ground; for their jaws are so strong as to inflict a severe wound when the insect is incautiously handled. Nor does the mischief end with their life, for their dead bodies often accumulate in such numbers that the air is even dangerously infected. They infest Africa and Central Asia, but they annually make incursions to Europe and America, where the damage they occasion is much less reparable than in their native land; for there the power of vegetation is so great that a few days repair the injuries caused by them, but in Europe a whole year is required for that purpose. The following account of these creatures is extracted from Mr. Cumming's "South Africa":

"On the following day I had the pleasure of beholding the first flight of locusts that I had seen since my arrival in the colony. We were standing in the middle of a plain of unlimited length, and about five miles across, when I observed them advancing. On they came like a snow-storm, flying slow and steady, about a hundred yards from the ground. I stood looking at them until the air was darkened with their masses, while the plain on which we stood became densely covered with them. Far as my eye could reach, east, west, north, and south, they stretched in one unbroken cloud; and more than an hour elapsed before their devastating legions had swept by. . . .

"Locusts afford fattening and wholesome food to man, birds, and all sorts of beasts; cows and horses, lions, jackals, hyenas, antelopes, elephants, etc., devour them. We met a party of Batlapis carrying heavy burdens of them on their backs. Our hungry dogs made a fine feast on them. The cold frosty night had rendered them unable to take wing until the sun should restore their powers. As it was difficult to obtain sufficient food for my dogs, I and Isaac took a large blanket which we spread under a bush, whose branches were bent to the ground with the mass of locusts which covered it, and having shaken the branches, in an instant I had more locusts than I could carry on my back; these we roasted for ourselves and our dogs."

Our common grasshoppers belong to this order, but require no description.

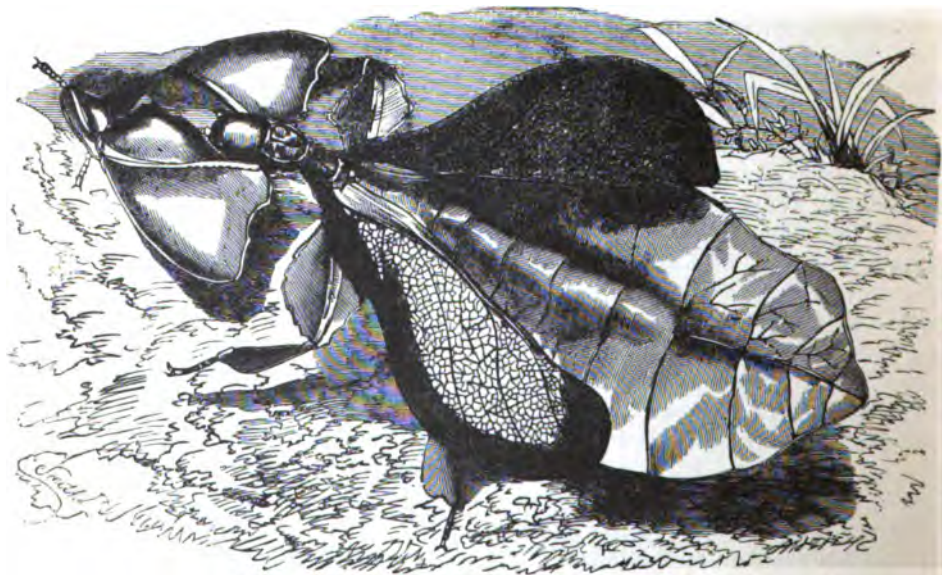
The HOUSE-CRICKET.—This well-known insect delights to live in places that are always warm, and consequently is found swarming about ovens, kitchen fireplaces, and localities of a similar nature. It makes its residence by cutting away

the mortar with its powerful jaws, and so effectually will it do so, that it sometimes eats completely through the wall, opening communications between two or more houses. The manner in which it bears heat is wonderful, as it will live within a few inches of a fierce fire.

But the aridity and heat of the atmosphere in which it lives render it very liable to thirst, and it consequently seeks every opportunity of quenching its thirst, by gnawing holes in wet linen, devouring any moist crumbs that may lie on the floor, or boldly climbing the milk-pan, in which latter case it gets a little too much liquid, and is generally "found drowned" next morning. The wings of this insect, as well as those of the field-cricket, are very beautiful, and marked with an elegant pattern. The cricket never appears to use them except at night, when it may be taken on the wing.

The MOLE-CRICKET.—The curious insect called the mole-cricket is not uncommon in this country. It inhabits sandy banks, digging deep holes, and forming chambers, in which the eggs are laid. The fore legs closely resemble those of the mole, and are used for the same purpose. From its not unmusical cry it is called in some places the churr-worm, and the rustics call it "croaker."

The LEAF INSECT is an inhabitant of South America. Not only does it resemble a leaf in shape, but even color, and its legs may be easily mistaken for dry



LEAF INSECT.—*Phyllium scythe*. (Female.)

twigs. Even the ramified veinings of the leaf are preserved on its wings. It is singular that while some insects closely resemble vegetables, some vegetables, as the *Orchidaceæ*, should as closely resemble insects. Nearly connected with this insect is the praying mantis, so called from the curious manner in which it holds its fore legs. It is very voracious and exceedingly quarrelsome, fighting with the fore legs, which it uses like a sword. In China the inhabitants keep them in cages, and set them to fight as in other countries certain barbarians keep cocks for the same purpose.

THE COCKROACH.—Once upon a time the French Academy were compiling a dictionary. Being determined to be quite accurate, they submitted each scientific word to some one skilled in that particular branch. One of these words was "lobster," which the academicians defined as a little red fish that runs sideways. The word, being zoological, came under Cuvier's notice, who, on reading the definition, observed that it would have been a very good one but for three trifling circumstances, the first being that the lobster is not red until boiled, secondly that it is not a fish, and thirdly, that it does not run sideways.

In like manner the cockroach has suffered under the hands of housewives, who express their contempt of it under the name of "black beetle," a name egregiously false, as, in the first place, it is not black, and in the second place, it is not a beetle. It belongs to the order *Orthoptera*, and its color is a mahogany red. But, red or black, beetle or not, it is a very great plague, and fully deserves all the maledictions heaped upon it, which are not likely to be decreased by the fact that it is not even an ancient nuisance, but one of modern importation.

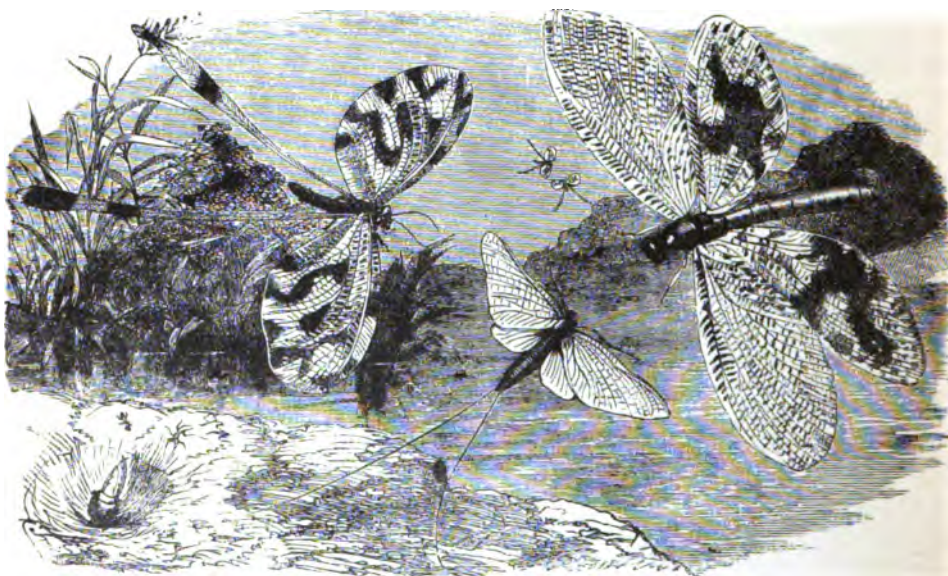
Its unpleasant character has caused innumerable plans to be laid for its destruction. Among these, strewing the ground with the peel of cucumber, or with red wafers, is said to be effectual in destroying the cockroaches, but perhaps no plan is so successful as the glass pan with sloping sides, which lets the insects fall in, but prevents their escape altogether.

The eggs of the cockroach are deposited, indeed, in little cases or purses, something like those of the shark, but without the strings. Down one side a thick toothed ridge runs, and by this ridge the young escape when hatched. The male cockroach is furnished with very handsome wings, while the female is entirely destitute of these organs, and only possesses four little scales to mark their position.

THE COMMON MAY-FLY is so well known an insect that it needs no long description. It is the fly so familiar to anglers under the name of the "Drake," It is to be found in swarms in the end of May and the beginning of June, rising and falling in the air in its peculiarly undulating manner.

The May-fly spends the first portion of its existence in the water, under the shape of a longish grub, with leaf-like appendages to its tail. About May the grubs may be seen to leave the water, and to crawl up the banks or climb the stems of

aquatic plants. The skin then splits, and the may-fly creeps out. But it cannot immediately fly, as its wings are soft, and like two split peas. A short interval of exercise in the open air soon loosens them, and they are gradually shaken out until



Nemoptera Coa.

ANT-LION.—*Myrmecoleg transylvan.*

MAY-FLY.—*Ephemera vulgata.*

they have attained their full size, when the insect flies off. There is, however, another change yet. In a short time, the May-fly again settles, and sheds the entire skin a second time, even including the covering of the wings. These cast skins are often found sticking on the bark of willow-trees by the side of waters, and are mistaken for dead May-flies.

The DRAGON-FLY.—Well do the dragon-flies deserve their name. Fierce, voracious, active, and powerful, they are a scourge to the insects. Few but the Coleoptera can escape them. They are on the wing nearly the whole day, seizing, and devouring flies, spiders, and various insects; nor can even the broad-winged butterfly escape them; so voracious are they, that when held in the hand they will devour flies, etc., if held within their reach, and they have even been known, when their bodies have been severed in two, to eat flies, although they had no stomach to put them in. I once caught a dragon-fly in my net, and while holding it by the wings I presented to it no less than thirty-seven large flies in rapid succession, all of which

it devoured, together with four long-legged spiders. It would probably have eaten as many more had I not been tired of catching flies for it.

A very great variety of these beautiful insects inhabit the United States. Some, the *Agrionidæ*, whose head resembles that of the hammer-headed shark, are of every vivid color imaginable, floating in the air like beams of azure, emerald, and rosy light, while others have their wings marked with large indigo-colored spots. The larva of the dragon-fly inhabits the water, and is quite as voracious as in its perfect state. Affixed to its head is a curious set of organs, called the mask, which it can extend, and use for the purpose of seizing its prey, and holding it to its mouth.

THE ANT-LION.—This insect in its perfect form, although it is very elegant, exhibits no peculiarity worthy of notice, but in its larva state its habits are so extraordinary as to have excited general attention. As it is slow and awkward in its movements, it has recourse to stratagem for capturing the agile insects on which it feeds. Choosing a light sandy soil, it digs for itself a conical pit, at the bottom of which it conceals itself, leaving only its jaws exposed. When an unwary insect approaches too near the edge of the pit, the sand gives away, and down rolls the insect into the very teeth of the concealed ant-lion, who instantly pierces its prey with its calliper-shaped fangs, and sucks out its juices through the jaws, which are hollow. Should, however, the ant-lion miss its prey, and the insect endeavor to escape, its captor instantly makes such a turmoil by tossing up the sand with its closed jaws, and covering each side of the pit with the moving grains, that the insect is tolerably certain to be brought down to the bottom, and is seized by the ant-lion, who immediately drags it below the sand. When the insect is very strong and struggles hard to escape, the ant-lion shakes it about as a dog does a rat, and beats it against the ground until it is disabled.

THE TERMITES, OR WHITE ANTS, as they are very erroneously called, belong to the *Neuroptera*, and are therefore not ants at all. These insects live in large societies, and build edifices, sometimes of enormous size, and almost as hard as stone. Twelve feet in height is quite common, so that were we to compare our works with theirs, St. Peter's in Rome and the Capitol at Washington fall infinitely short of the edifices constructed by these little creatures. The common termite inhabits Africa. Not only does it build these houses, but runs galleries underground, as curiously enough, although blind, it always works either at night or in darkness. In each house or community, there are five different kinds of termites: 1, the single male, or king, whose life is very short; 2, the single female, or queen: these are the perfect insects, and have had wings, but have lost them soon after their admission into their cell; they also have eyes; 3, the soldiers or fighting men: these possess large jaws, do no work, but repel adversaries and watch as sentinels; 4, the pupæ, who resemble the workers, except that they possess the rudiments of wings; and 5, the larvæ, or workers. These do all the *work*, i.e. they collect food,

attend to the queen, and watch over the eggs and young, and build and repair their castle. These are more numerous than all the other kinds.

On the approach of the rainy season, the pupæ obtain wings and issue forth in swarms. Few, however, survive. Myriads are devoured by birds, reptiles, and even by man; and many are carried out to sea and perish there. Those that do escape are speedily found by the laborers, who inclose a pair in a clay cell from which they never emerge. The male soon dies, but the female, after rapidly increasing to nearly three inches in length and one in breadth, continues to lay eggs unceasingly for a long time. This cell becomes the nucleus of the hive, and round it all the other cells and galleries are built.

These insects are terribly destructive, as they eat through wooden beams, furniture, etc., leaving only a thin shell, which is broken down with the least extra weight, and many are the occasions when an unsuspecting individual, on seating himself on an apparently sound sofa or chair, finds himself, like Belzoni in the Pyramid, reposing among a heap of dust and splinters. Mr. Cumming describes the habitation of the white ant in these terms :

"Throughout the greater part of the plains frequented by blesboks, numbers of the sunbaked hills or mounds of clay formed by the white ants occur. The average height of the ant-hills in these districts is from two to three feet. They are generally distant from one another from one to three hundred yards, being more or less thickly placed in different parts. These ant-hills are of the greatest service to the Hunter, enabling him with facility to conceal himself on the otherwise open plain."

THE CADDIS-FLY.—This fly is well known to every angler both in its larva and in its perfect state. The larva is a soft white worm, of which fishes are exceedingly fond, and it therefore requires some means of defence. It accordingly actually makes for itself a movable house of sand, small stones, straws, bits of shells, or even small living shells, in which it lives in perfect security, and crawls about in search of food, dragging its house after it. When it is about to become a pupa, it spins a strong silk grating over the entrance of its case, so that the water necessary for its respiration can pass through, but at the same time all enemies are kept out. When the time for its change has arrived, the pupa bites through the grating, rises to the surface, and crawls out of the reach of the water, which would soon be fatal to it. The skin then splits down the back, and the perfect insect emerges.

The order is called Trichoptera, because the wings, instead of being covered with scales as are those of butterflies, are clothed with hairs. There are many species of Caddis-flies.

THE ICHNEUMON-FLY.—We have now reached a most important and interesting order. In it are contained the bees, wasps, ants, etc. This is the only order where the insects possess stings. The wings are four in number, with certain veinings upon them, the shape and number of which in many cases distinguish the species.

The ichneumons form a very large section. They are most useful to mankind, as one ichneumon will destroy more caterpillars than a man could kill in his lifetime. They do not, as most other insects, deposit their eggs upon vegetable or dead animal substances, but they actually bore holes in other insects, while they are still in the larva state, and leave the eggs to hatch in their living receptacle. The most common ichneumon (*Microgaster glomeratus*) is a very small insect, not so large as an ordinary gnat. This little creature may be seen searching for caterpillars. It generally selects the common cabbage caterpillar, and, sitting upon it, pierces with its sting, or ovipositor, as it is called, the skin of the caterpillar, and deposits an egg. After repeating this operation many times it flies off, and the caterpillar proceeds as before in the great business of its life—that is, eating—and continues in apparently perfect health until the time for its change into the chrysalis state occurs. The good condition of it, however, is merely deceptive, for the offspring of the little ichneumon have all this while been silently increasing in size and feeding on the fat, etc., of the caterpillar, but cautiously avoiding any vital part, so that the plump appearance of the caterpillar is merely produced by the young ichneumons lying snugly under the skin. Just as the caterpillar commences its change, out come all the ichneumons, looking like little white maggots, and immediately each spins for itself a yellow oval case, frequently enveloping the form of the now emaciated caterpillar. In a few days a little lid on the top of each case is pushed open, and the perfect flies issue forth, and immediately commence their own work of destruction.

I have examined hundreds of caterpillars in the course of dissection, and have seldom found them free from ichneumons. I took out of one small goat caterpillar 137 of these insidious destroyers. I found them useful auxiliaries in dissection, as they had usually consumed all the fat, leaving the important organs ready cleared.

The remaining Hymenoptera are furnished with true stings, that is, with stings to which is attached a poison apparatus, like that belonging to the teeth of venomous snakes.

The WOOD-ANT is the largest of our American species. It is found principally in woods, and builds a large nest, which looks like a hillock of sand and earth, intermixed with bits of stick, leaves, etc. The interior of this hill is chambered out into a variety of apartments, and is traversed by passages. The so-called ants' eggs are not eggs at all, but the *pupa* cases of the insect, and, if opened, the perfect insect is seen curled up inside. In the autumn the ants burst forth by thousands, and may be seen hovering in clouds above the nest. Their beautiful wings do not last long, for when a female ant escapes, and founds an infant colony, her wings are soon lost, just as a highly accomplished young lady gives up her velvet painting and cross-stitchery when she marries and has a large family. Few *do* escape, as the birds find these living clouds a most agreeable and plentiful repast.

Ants do not, as has been so frequently said, lay up stores of corn for the winter, for they are in a state of torpidity during the cold months, and require no food. Moreover, an ant would find as much difficulty in eating or digesting a grain of corn as we should in devouring a truss of straw. In each nest are three kinds of ants—males, females, and neuters, or workers.

The WASPS.—Let us honor the wasps as the first paper-makers, for of that material is the nest composed. The paper is rough and coarse certainly, but it is still paper. The wasp, in order to make this paper, rasps off fibres of decayed wood, which it afterward mashes with its teeth into a pulp, and then spreads the pulp in layers, when it hardens and forms coarse paper.

The dreaded HORNET is usually found in woods, where it builds its nest in the hollows of trees. A deserted hut is a favorite spot, and when occupied by a full nest of hornets is not particularly safe to enter, as the sting of this insect is peculiarly severe. In 1847, while on an entomological excursion in Bagley Wood, I saw five hornets sitting in a row, gnawing a dead branch. I was rather fearful of disturbing them, but at the same time they were much wanted for a museum. They were all secured by tapping each in succession with a twig, and receiving it into my net as it flew off. Each bit a hole in the net, which had to be repaired before it could be used again with safety. It feeds upon other insects, and even attacks and devours the formidable wasp.

The COMMON WASP builds its nest in the ground, usually in banks. The combs are laid horizontally, and not vertically like those of the bee. As the cells are made of paper, they will not hold honey, nor does the wasp endeavor to collect honey, although it is very fond of it, and never loses an opportunity of robbing a bee-hive, although its natural food is flies or other animal substances. Nor does it despise sugar, as every grocer's window testifies. A wasp flew into an open window and saw a broad web in a corner of the room with the spider's hiding-place extending down in the corner. The wasp flew under the web and examined this hiding-place closely, apparently to see if the spider was at home. Then, as if satisfied of the fact, flew out into the room, and, returning dropped down on the centre of the web, buzzing and fluttering like a fly. Thereupon the spider rushed out in great haste to capture his prey, and as soon as he came within reach the wasp picked him up and flew away with him.

Very few wasps survive the winter, and those who do immediately set about forming a new nest. Only a few cells are made at first, but the number rapidly increases, until the nest is furnished with about sixteen thousand cells. Some wasps build nests upon the branches of trees, and others suspend them from the branches.

The BEE.—This useful little creature is so well known that a lengthened description of it would be useless. A merely general sketch will be quite sufficient.

The cells of the bee are, as is well known, made of wax. This wax is secreted in the form of scales under six little flaps situated on the under side of the insect.

It is then pulled out by the bee, and moulded with other scales until a tenacious piece of wax is formed. The yellow substance on the legs of the bees is the pollen of flowers. This is kneaded up by the bees, and is called bee-bread. The cells are six-sided, a form which gives the greatest space and strength with the least amount of material, but the method employed by the bees to give the cells that shape is not known. The cells in which the drone or male bees are hatched, are much larger than those of the ordinary or worker bee. The edges of the cells are strengthened with a substance called propolis, which is a gummy material procured from the buds of various trees. This propolis is also used to stop up crevices and to mix with wax when the comb has to be strengthened.

The royal cells are much larger than any others, and are of an oval shape. When a worker larva is placed in a royal cell, and fed in a royal manner, it imbibes the principles of royalty, and becomes a queen accordingly. This practice is adopted if the queen bee should die, and there be no other queen to take her place.

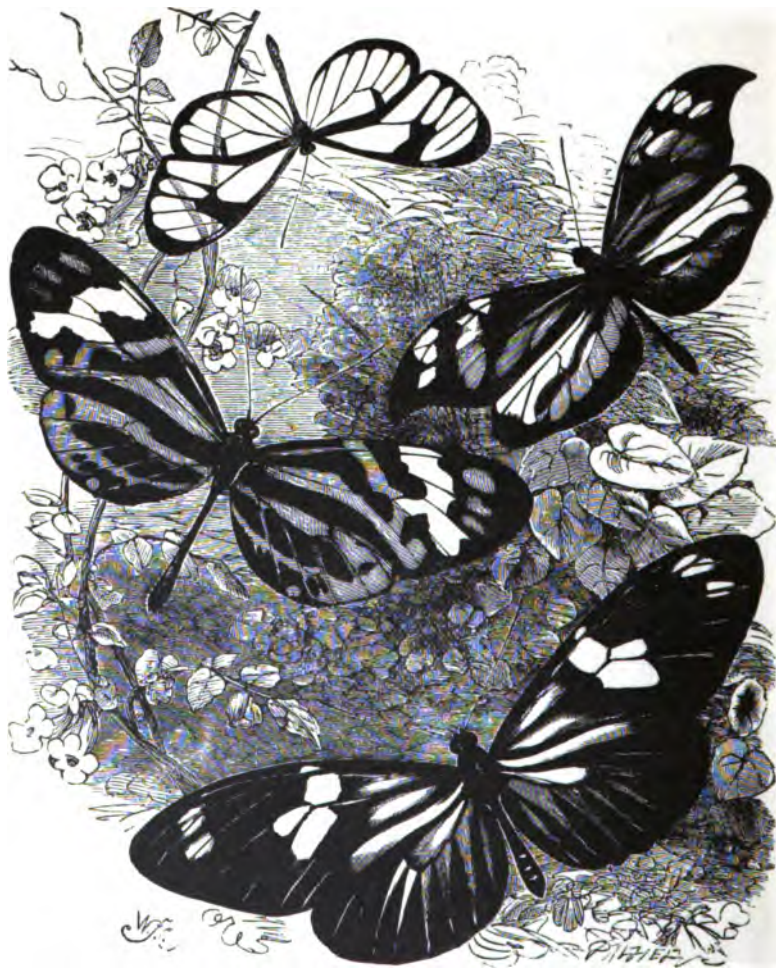
The queen bee is lady paramount in her own hive, and suffers no other queen to divide rule with her. Should a strange queen gain admittance, there is a battle at once, which ceases not until one has been destroyed. At the swarming time, the old queen is sadly put out by the encroachments of various young queens, who each wish for the throne, and at last is so agitated that she rushes out of the hive, attended by a large body of subjects, and thus the first swarm is formed. In seven or eight days, the queen next in age also departs, taking with her another supply of subjects. When all the swarms have left the original hive, the remaining queens fight until one gains the throne.

The old method of destroying bees for the sake of the honey was not only cruel but wasteful, as by burning some dry "puff-ball" the bees are stupefied, and shortly return to consciousness. The employment of a "cap" on the hive is an excellent plan, as the bees deposit honey alone in these caps, without any admixture of grubs or bee-bread. Extra hives at the side, with a communication from the original hive, are also useful. The queen bee lays about eighteen thousand eggs. Of these about eight hundred are males or drones, and four or five queens, the remainder being workers.

THE SWALLOW-TAILED BUTTERFLY.—We now arrive at the *Haustellate Insects*, so called because they suck liquid food through an apparatus resembling the proboscis of an elephant. The first order of *haustellate insects* is the *Lepidoptera*, containing the butterflies and moths. The butterflies always fly by day, from which circumstance they are sometimes called *Diurnal Lepidoptera*. Most of the moths fly by night, and are called *Nocturnal Lepidoptera*. This is not a rule, however, as many moths fly by day, and some butterflies come out in the evening. Butterflies are usually lighter in the body than moths, from which insects they are easily distinguished by the shape of the antennæ, which in the butterflies are slender and

end in a small knob, but in the moths terminate in a point, and are often beautifully fringed.

The name *Lepidoptera* is given to these insects because their wings are covered



BUTTERFLIES.

with myriads of minute scales, by which the beautiful coloring of the wings is produced. These scales vary in size and shape, according to the species or the part of the wing from which they are taken. Under the microscope they are most ex-

quisite objects, and well repay a long and careful examination. The Lepidoptera pass through three distinct changes before assuming their perfect form. They first exist in the larva state, in which state they are called caterpillars. They then pass to the pupa state, when they are known by the name of "aurelias" * or "chrysalides," † both words being derived from words signifying gold, from the golden lustre of the pupa of certain butterflies. When they have remained in the pupa state during a time varying from a few days to two years, they burst their shells and issue forth in their full and perfect beauty. This transformation has for many ages been used as an illustration of the resurrection after death.

The FRITILLARIES are well deserving of notice for the delicacy of their coloring, and the beauty of their markings. The silver-spotted fritillary is remarkable for the peculiar appearance presented by the under surface of the wings, which look as if they had been studded with pieces of burnished silver leaf. It is found mostly on thistles in woods, and is very common about the end of June, or during July.

The RED ADMIRAL is one of the most gorgeous of our butterflies. The color of the wings is a deep black, relieved by a broad band of scarlet across each, and a series of semicircular blue marks edge each wing. It is usually found in woods and lanes, where there are nettles, as the larva feeds upon that plant. It appears about the middle of August.

The DEATH'S-HEAD MOTH.—This family is called Sphingidæ on account of the sphinx-like attitude that the caterpillars of some species assume. The larva of the Puss moth (*Cerura vinula*) is particularly celebrated for this position. It holds the plants on which it feeds with its hinder feet, and raises the fore part of its body, just as the sphinx is represented. When in this position, it seems so remarkably self-satisfied, that the gardener of Rosel, a famous naturalist, was quite disconcerted, affirming that he never saw insects hold their heads so high.

The death's-head moth is the largest of the British Lepidoptera, as it not unfrequently measures nearly six inches across the wings. Its rather ominous name is derived from the singular marking in the thorax, which does not require much im-



LARVA.—BUTTERFLY.

* Lat. *Aurum*, gold.

† Gr. *Χρῑος*, gold.

agination to represent a skull and cross-bones. Some naturalists have asserted that this moth makes its way into bee-hives, and robs the inhabitants of their honey, disarming their resentment by a curious squeaking noise which it has the power of producing.

The uneducated rustics have a great horror of this insect, and consider its appearance as a most disastrous omen. In a small village removed from the influence of railways, on one Sunday morning, as the inhabitants were going through the churchyard, a death's-head moth appeared on the path. Every one recoiled in dismay, and no one dared approach the dreaded object. Sundry heads were shaken at the evil omen, and various prophetic remarks made. At last, the blacksmith summoned up courage, and with a great jump, came down on the unfortunate moth, and happily destroyed it. The people were in blissful ignorance that, as there were several fields near by planted with potatoes, on which vegetable the caterpillar generally feeds, there were probably a few hundred of death's-head moths in the vicinity.

I have this specimen now in my possession ; it is of course mashed quite flat. It is a very singular fact that those who, living so much in the open fields, would be supposed to have correct knowledge of natural phenomena, are really profoundly ignorant of facts that pass daily before their eyes. I have already mentioned the popular superstitions regarding efts. In common with many other nocturnal insects, the eyes of the death's-head moth shine at night like two stars, which adds considerably to the terror inspired by its appearance.

THE HUMMING-BIRD MOTH. This curious insect is called the humming-bird moth, because its appearance when on the wing exactly resembles that of a humming-bird. It feeds on the wing as the bird does, hovering before each flower and sucking out the honey by means of its very long proboscis. It is very shy, and darts off if the slightest movement is made ; but if the spectator remains perfectly quiet, the moth sees no danger, and will continue its meal within a yard of him. The moth appears to gain confidence if it is not disturbed, and in a few days will become almost tame, permitting the spectator to whom it is accustomed to approach quite closely without appearing alarmed.

THE TIGER-MOTH.—This common but beautiful moth is found in the beginning of autumn. It runs on the ground with such swiftness as to be often mistaken for a mouse. I have more than once seen a kitten chasing a tiger-moth among the flowers in a garden, evidently deceived by its resemblance to a mouse. The larva is popularly called "the woolly bear." It is rather large, and is surrounded with tufts of long elastic hairs of a reddish brown color, which serve as a defence against many enemies. When disturbed, it rolls itself round, just as a hedgehog does, and if on a branch, suffers itself to fall to the ground, when the long hairy covering defends it from being injured by the fall. When the caterpillar is about to change into a pupa, it spins a kind of hammock, and lies there until it comes forth as a

moth. The color and markings of this moth vary considerably. The usual tints are: the thorax brown, the body red, striped with black; the two anterior wings are cream color, marked with bold patches of a deep brown; the posterior wings are bright red, spotted with bluish black.

The larvæ of the GEOMETRIDÆ move in a very singular manner. When preparing to make a step, they hold firmly by their hinder legs to the substance on which they are moving, and then stretch out their body to the fullest extent, as if measuring their distance. After these preliminaries, they take a firm hold with the fore feet, and draw the hinder feet up to them, forming their body into an arch or loop. When at rest, the caterpillars often deceive an observer by their close resemblance to twigs, as they stretch themselves out motionless from the branch.

The family is very large, and contains many interesting species, but want of space compels me to omit all but the SWALLOW-TAILED MOTH. The caterpillar of this moth feeds principally on the elder, willow, and lime, and the moth appears in June and July. It is one of the largest of the British Geometridæ, as the spread of the wing considerably exceeds two inches. Its color is a pale yellow, and the lines across the wings are deep yellow. It derives its name from the shape of the hinder wings.

The MANY-PLUMED MOTH is found toward the close of autumn, usually running about windows. It is very small, measuring barely half an inch across the wings. The structure of the wings is very curious, each of the two anterior wings being divided into eight beautiful feather-like rays, and each of the posterior into four rays. Nearly allied to this are the common Feather Moths, the most common of which is the White-plumed Moth, whose wings measure nearly an inch across, and are divided into five feathered rays.

DIPTERA.—The insects of this order possess but two wings, the place of the others being supplied by two little organs something like drum-sticks, called “balancers.” Without these the insect seems to be unable to direct its flight.

All are familiar with the COMMON GNAT. This pretty tormentor passes its larval existence in the water, in which state thousands may be seen in any uncovered water-butt, wriggling about with the most untiring energy, or reposing head downward, only leaving the end of the tail at the surface. The reason for this is very curious. This larva breathes through its tail, and is moreover enabled by means of a fringe of hairs to carry air down with it.

It is a singular circumstance, that although the larva lives in the water, yet were either the eggs or the perfect insect to be submerged, they would be destroyed. The instinct of the gnat, in order to fulfil all three conditions, is very beautiful. When the gnat wishes to deposit its eggs, it rests itself on a leaf or twig on the surface of the water; it then takes each egg separately, and fastens them side by side in such a manner that they actually form a little boat, which will neither fill with water nor upset, however the water may be agitated. In a few days the eggs

are hatched, when a little lid opens in the under end of each egg, and down tumbles the larva into the water. After remaining in the water for some days it assumes the pupa form. In this state it floats at the surface with the back of the thorax uppermost. Soon this splits, and the insect emerges, standing on its own cast skin, which forms a raft for it till its wings are fully dry, when it takes to flight, leaving behind it the empty shell floating on the water. This change may be witnessed any warm day in summer.

The GADFLY has from the most ancient times been known as the terror of the herd. At the sound of its approach the cattle are driven almost mad with terror. The young gadflies are nourished under the skin, where they remain until they are fit to pass into the pupa state, when they bury themselves in the ground, and after a few days spent under the earth, issue forth in their perfect state.

The HUMBLE-BEE FLY.—This very curious insect is found in the early days of spring, and may be seen hovering over the primroses and other spring flowers. It feeds in the same manner as the humming-bird moth, and much resembles that insect in many of its habits.

The FLEA.—The strength and agility of this curious but annoying little insect is perfectly wonderful. Many of my readers have doubtless seen the exhibition of the Industrious Fleas, who drew little carriages, and carried comparatively heavy weights with the greatest ease. The apparatus with which it extracts the blood of its victims is very curious, and forms a beautiful object under a microscope of low power. Its leap is tremendous in proportion to its size. This property it enjoys in common with many other insects, among which the Common Grasshopper, the Froghopper, and the Halticas or Turnip-flies are conspicuous. In all these insects the hinder pair of legs are very long and powerful.

I am here most reluctantly compelled to close this little work. Most willingly would I have entered into a sketch of the remaining classes. These, however, are so numerous, and their habits are so different from those of the creatures whom we have already examined, that even a very slight description would consume too much space and time.

Here, then, I take my leave of the reader, with a sincere hope that the perusal of this volume will not only have proved interesting, but will also have given him some insight into the beautiful order of the animated world.

THE END.

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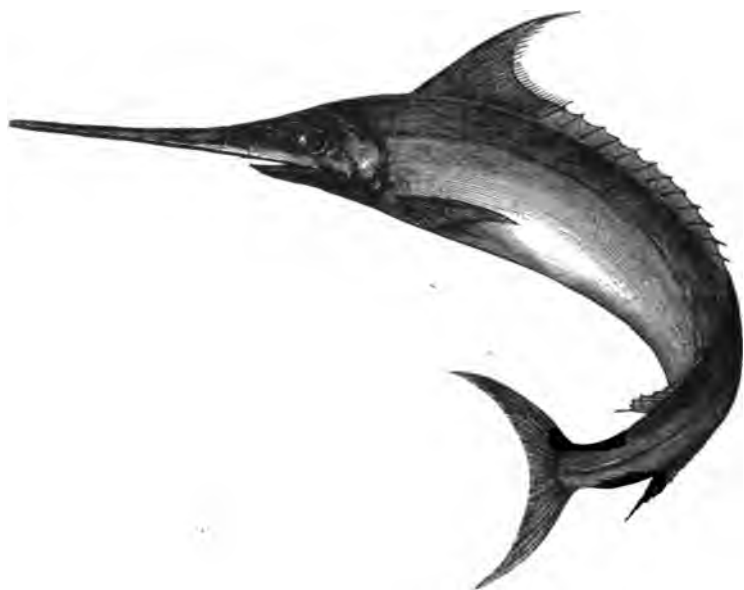
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